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PROCEEDINGS
OF THE
ZOOLOGICAL SOCIETY OF LONDON.

January 8, 1850.

William Yarrell, Esq., Vice-President, in the Chair.

The following papers were read :—

1. CONTRIBUTIONS TO THE KNOWLEDGE OF THE ANIMAL OF
NAUTILUS POMPILIUS. BY J. VAN DER HOEVEN.

There are hitherto but three original figures of the animal of *Nautilus Pompilius*. The first is that of Rumphius, in his 'Amboinsche Rariteitskamer' (No. xvii. at p. 62); the second that of Prof. R. Owen in his accomplished 'Memoir on the Pearly Nautilus' (London, 1832, pl. 1); the third, drawn by Mr. Laurillard, was given by Prof. Valenciennes in the 'Archives du Muséum d'Hist. natur.,' ii. 1841, pl. 8.

The figure of Rumphius could only be deciphered after the discovery of a new specimen. As Prof. Owen has observed, the animal is represented in that figure in an inverse position. Guided by that observation, it is possible to explain some parts in that enigmatical figure, but many obscurities still remain, and the whole gives the impression of a drawing made by recollection, and after the doubtful suggestions of a discomposed memory. This seems still more probable, because the text informs us (p. 61) that the figures to which the indications of the description allude, have been lost.

The animals represented by Prof. Owen and Valenciennes were detached from the shells before they were presented to those distinguished cultivators of comparative anatomy and structural zoology. This circumstance explains some imperfections in the figures given by both. Prof. Owen, for instance, gives an incorrect form to that production of the mantle which covers the convex part of the shell's circumvolution projecting in the aperture, or to the part which the author calls "the dorsal fold" (see his pl. 1 *b*); the superior free

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margin of the mantle is lower than it ought to be, as it conceals in the natural state a great part of the funnel and the inferior half of the eyes. In regard to the last circumstance, the drawing of Laurillard given in M. Valenciennes' paper is more correct; but in other particulars it is deficient, chiefly because the soft part of the integuments which forms the visceral sac was torn off and wholly wanting. It ought to be observed also, that those two figures represent the animal replaced in a shell of the same species indeed, but not its own.

I suppose then that it may be perhaps of some interest to publish some drawings* I made, chiefly after two specimens, one of which was kindly presented to me in 1848 by Prof. Reinwardt; the other I received lately from our settlements in the East, by the kind exertions of His Excellency Mr. T. C. Baud, formerly His Majesty the King of the Netherlands' Minister for the Colonial Department.

The first figure (1) represents the animal from the left side in its own shell, which has been opened with a file at such a height, that the whole last chamber was visible, together with a part of the three following compartments. The hood (*a*), composed according to Prof. Owen by the conjunction in the mesial line of the two superior, excessively large digitations, covers with its projecting margin the superior surface of the pedunculated eye (*b*). The inferior half of the eye is concealed by the superior margin of the mantle, which covers also the greatest part of the digitations or lateral processes of the head (*c, c*). The extremity of the funnel (*d*) is visible and uncovered, the rest being contained in the anterior part of the mantle. There is no perforation or excision at this part of the mantle†, but the margin of it is entire and slightly convex.

The mantle (*f, f, f', i*) has its anterior part of a more thick and fibrose texture and a yellowish colour; the posterior part (*i*) forms a thin and nearly transparent membranous sac, containing the different viscera. The free superior margin of the mantle ascends behind the hood (*f'*) and forms the dorsal fold of Prof. Owen's memoir; but at the side view only a small portion of this fold is visible. Beneath the posterior part of the hood, the mantle offers on each side a large aponeurotic flat piece (*g*), of a bluish white colour and a kidney-like shape, being convex at its anterior side and somewhat concave at the posterior border. This plate is the posterior insertion of a strong muscular mass—the great muscle of the shell—which goes from this attachment in an oblique course, converging with that of the opposite side, to its anterior termination at the cartilage of the head. From this oblong patch arises a narrow aponeurotic stripe, both at the superior and at the inferior extremity of it. The oblong plate may be considered as an expansion and development of this band, which, encircling the whole mantle, separates its posterior soft part or the visceral

* The drawings, being on too large a scale for this work, will be published in the Transactions of the Society, vol. iv. Pl. 5, 6, 7, 8. The references are to those plates.—D. W. M.

† Professor Owen speaks of a large aperture through which the funnel passes. (Memoir on the Nautilus, p. 9.)

sac (i) from its free and thicker anterior part. The thin and membranous posterior part of the mantle is of a bluish white colour, but being imperfectly transparent, it seems to be dark at all places where it covers the bulky liver, whose colour is a dark red-brown, or chocolate-like purple. At the inferior part of the free portion of the mantle is a convexity (h), where lies a glandular laminated organ, secreting, as it seems, a covering to the eggs, and which projects at this place, being partly visible through the integuments. This glandular mass connected with the female generative system is situated behind the gills, at the inner surface of the mantle.

A more complete idea of the external form of the animal may be had by comparing the two following figures. Fig. 2 represents the animal taken out of the shell from a dorsal aspect. The circumference appears oblong, and of an irregular oval form. The whole is divided into two chief parts; the first is the hood, exactly filling up the shell's aperture*; the second part was concealed in the lower and posterior part of the terminating chamber of the shell. The dorsal fold (f') appears now wholly visible; it forms a thin lamellar production of the mantle, and ascends to the protuberant internal labium or anfractus of the revolved shell. Hence the upper surface of this fold is excavated, forming the exact counterpart of the shell's protuberance. Under that fold is a smaller plate of nearly the same form, but adherent to the posterior declivous surface of the hood, and only free at its circumference. This plate is of an aponeurotic texture and a white colour: at both sides it is united to the dorsal fold, and below it seems to have an intimate connexion with the two side parts of the funnel, and indeed to be a continuation of those parts. The dorsal or superior part of the aponeurotic band, which forms, as we have said already, the continuation of the oblong side-plate (fig. 1 g), is here visible at g, g. Three small longitudinal bands or tendinous inscriptions (h, h, h) seem to give some firmness to the dorsal part of the abdominal portion of the mantle. Near the posterior end of this visceral sac, nearer however to the superior surface of it, is the beginning of the siphon (j); it seems nearly superfluous to say that this siphon is a tubular production of the visceral part of the mantle, protected by a calcareous covering, and penetrating by the central perforation of the several septa in all the following compartments of the shell.

At the inferior surface (fig. 3) a part of the funnel is visible in the middle of the digitations of the head. The inferior face of those digitations is of a white colour, contrasting with the brown and dark colour of the hood and of the superior surface of the digitations which are nearest to it. The free inferior and anterior margin of the mantle appears rounded and somewhat convex; it conceals the basal part of the funnel and of the appendages of the head.

More instructive is an inferior view of the animal if the mantle has

* It may be allowed to hazard here the opinion, that the two juxtaposed fossil shells, known by palæontographs as *Aptychus*, were two shelly supports of the hood of *Ammonites*, extinct Cephalopods not very different in structure from the *Nautilus*, and belonging, like that genus, to Prof. Owen's tetrabranchiate group.

been removed or reflected backwards ; in this manner the branchial cavity is visible (fig. 4).

The two overlapping sides of the funnel form a striking particularity of the structure of the Nautilus. It is interesting that the embryo in the dibranchiate group, as we learn from Dr. Kölliker's observations*, shows the funnel composed in the beginning of two lateral separate parts. The embryonic condition in the dibranchiate Cephalopods proves thus to be a persistent structure in the tetrabranchiate group.

Between the basal part of the second pair of gills the anal aperture is visible. This part has been misrepresented by Prof. Valenciennes. It seems that a longitudinal fold connecting the integuments of the viscera with the two large shell-muscles was disrupted in his specimen, and that the author believed this to be the rectum. The oviduct in this supine position is situated at the left side, before the anus, and terminates with a transverse bilabiated and protuberant aperture or vulva. [Consequently, when the animal is in its natural position in the shell, the termination of the oviduct lies at the right side.]

There are three little slits on each side at the roots of the branchiæ. The first pair of those apertures is situated at the anterior surface of the first branchia, near the posterior margin of the large shell-muscle. Between the first and second branchiæ are the two other slits, very near to each other, and at the outward side of them is a little depressed papilla, affixed to the posterior surface of the root of the first branchia. The first and the last slits are the exterior openings of two lateral blind sacs, containing the follicular appendages of the branchial arteries ; the second slit communicates with the pericardium†. At the first slit I once found a calcareous reddish-white and friable concrement ; I believed it to contain uric acid, but the chemical inquiry of my friend Prof. Van der Boonchesch has not confirmed my supposition.

Behind the anus there are on each side two small and depressed caruncles, very similar to that mamillary eminence or papilla we have seen at the root of the first branchia. External to those caruncles and behind them is a series of small orifices, not unlike to the openings of the Meibomian follicles on the human eyelids. These are the emunctories of the glandular organ, for the secretion of the covering matter of the ova.

* Entwicklungsgeschichte der Cephalopoden. Von Dr. A. Kölliker ; Zurich, 1843, 4to, p. 41 etc.

† The three pairs of openings have been first observed by Prof. Valenciennes. This point of the anatomy of the Nautilus has been chiefly elucidated by the observations of my friend Prof. W. Vrolik (Tijdschrift voor de natuurkundige Wetenschappen, uitgegeven door de Eerste Klasse van het Koninklijk-Nederlandsche Instituut, ii. 1849, p. 312-315). Prof. Owen describes in his memoir but one of those openings, and it is therefore questionable what opening he speaks of. It seems however to me to be the second, because Prof. Owen describes the mamillary eminence which is nearest to this slit, and chiefly because the author observes that the orifice "conducts from the branchial cavity to the pericardium." (Memoir on the Nautilus, p. 27.)

The head still requires some further description. In order to give a more correct idea of the mutual superposition of the numerous digitations and processes which exist in the Nautilus, instead of the eight or ten arms of the dibranchiate Cephalopods*, I have represented them from the left side, in three comparative figures, so as they follow each other from the exterior surface of the head to the interior covering of the mandible (see fig. 5-7).

In the first place (fig. 5), the mantle *f* being reflected, the hood (*a*), the different digitations (*c, c*), and the funnel (*d*), are visible. The large pedunculated and perforated eye (*b*) has two tentacles (ophthalmic tentacles, Owen), one before its anterior margin, the other behind, which are however not distinctly seen without reclining the surrounding parts, and bending the eye-peduncle*. Only a few tentacles are protruded from their sheaths, and partly visible. I never saw them protruded to such an extent as in M. Laurillard's figures. The number of these digitations seems not to be exactly the same in all specimens. Instead of nineteen digitations on each side, as in Prof. Owen's specimen, I twice found only eighteen. M. Valenciennes found only seventeen in his specimen. That the hood is formed according to the ingenious supposition of Prof. Owen, by two large digitations conjoined along the mesial line, has been mentioned above. The hood indeed contains two tentacles, and in this manner the whole number of exterior or digital tentacles varies from eighteen to twenty on each side.

The second layer of tentacular processes is brought into view by cutting off the hood and the external digitations. Fig. 6 gives a view of this dissection. In this figure *b* is the eye, *d* the funnel, as in the foregoing figure; *c, c* are the cut parts of the tentacles contained in the digital processes. The layer now visible is formed by that set of tentacular sheaths which Prof. Owen calls the *external* or superior labial processes (fig. 6 *k, k*). For a reason explained in the following part of my paper, I would be disposed to prefer the name of *external labial process* to that of *superior*. The membrane covering the mandibles and the muscular mass of the mouth, and terminating in the fringed lip encircling those parts, is to be seen at a little distance above this layer (at *m*), and shows numerous circular folds. Beneath this layer a small part of the third layer (*l*) is visible.

This third layer is brought into view by removing the second (see fig. 7). In this figure *k, k* are the cut parts of the tentacles of the external labial process, and *l* is the *internal* or inferior *labial process* of the left side. The folded membrane *m* is now almost wholly visible. The internal labial process consists of a flattened stalk, which ascending expands in a compressed paddle, whose superior margin is straight and perforated for the exertion of the tentacles. There is some likeness to a glove whose fingers are cut off. The description of Rumphius mentions all the digitations and pro-

* Under the eye is a part, first noticed by Valenciennes, a little hollow caruncle, with bilabiate aperture, which seems to be the true organ of smell (see fig. 8). It is only visible by bending the eye behind and above, and adheres to the root of its stalk.

cesses as superimposed flaps, each in shape of a child's hand*. This comparison answers chiefly to the internal labial processes.

The number of tentacles in those two pair of labial processes is not exactly the same in different specimens, nor even in the same specimen at both sides. The description of Rumphius gives sixteen tentacles to the external labial processes, but does not mention their number in the internal processes. Prof. Owen found twelve tentacles, Prof. Valenciennes thirteen in each of those four processes. In the external processes Prof. W. Vrolik observed twelve tentacles on each side, as was observed also by me. The internal processes seem to have in general a somewhat larger number; Prof. Vrolik observed in this layer fourteen on each side; I found also fourteen at the left and sixteen at the right side. The external labial processes are united in the mesial line at the ventral side above the funnel by a membrane with numerous fine folds on the inside; the internal approach here nearer to each other and are united in a similar manner; the commissure presents on the inside, towards the dorsal surface, seventeen or eighteen eminent, compressed, longitudinal folds, like the parallel ridges in the olfactory cavity of Fishes. This part is, according to Prof. Owen's opinion, the organ of smell; but I believe that those folds are only rudimental digitations completing the circle of the internal labial processes, and similar to the more numerous and smaller folds of the external circle, or even to the fringed margin of the lip round the mandibles.

In respect to the observation of Valenciennes concerning the mandibles, it is perhaps not unnecessary to note that I saw them in different specimens always covered with a calcareous white matter, as has been observed in the first accurate description of the animal by my eminent friend Prof. Owen.

The sexual difference of the *Nautilus* requires still further elucidation. Prof. Owen's description was relative to a female, and also all the other specimens observed by subsequent authors, or preserved hitherto in the museums, seem to be of female specimens. Hence it seems to follow that males are rarer; a similar circumstance of unequal number has been noted in many other animals of several classes. The recent observations of Köl liker and some other authors having elucidated the true nature of that abnormal animal form, not unlike to separated arms of Cephalopods, found in the shell of the (always female) *Argonauta*, and formerly described as a genus of worm under the name of *Hectocotyle* by Cuvier, would lead us to expect similar males of the *Nautilus* living like parasites with the female in her shell. There exists however not the least indication in the different memoirs of Owen, Valenciennes and Vrolik, that such parasites were present. I can say that in *Nautilus* the sexual difference is not so great, and that the male lives in a shell like the female. I was fortunate enough to observe one specimen of a male, which was kindly presented to me by my colleague at the Faculty of Sciences of the Leyden University, the Professor of Botany, W. H. de Vriese. The differences it showed

* "Zijnde ieder lap gefatzoeneerd als een hand van een kind." (Amboinsche Rareitkamer, p. 60.)

in the conformation of the head may be ascribed either to sexual difference or to monstrosity. This must remain unsettled till another male can be observed; but I incline to the first opinion, a similar aberration of structure not having been observed in any of the hitherto dissected females.

I have already described this male in a former paper*, but I believe it will not be superfluous to give here the translation of the chief matter of my Dutch memoir on this specimen, together with some additional remarks and corrections.

At the inner surface of the circle of digitations, which were eighteen at each side, without the hood, there was a prolongation of the integuments rising up to another more internal circle. This prolongation unites at the ventral side by a free and thin margin to the connecting basal part of the digitations. At the inner surface of this connexion of the external digitations, there are many transverse dimples parallel to the transverse margin of this commissure: many little holes give a reticulated appearance to this part. The prolongation becomes thicker and expands on each side in a processus divided in eight digitations of different size, including each a tentacle, similar to those contained in the external digitations of the head, but smaller, as usual in other specimens. On account of their place, those processes seemed first to me to be analogous to the *superior labial processes* of Prof. Owen's memoir, because they are situated at the dorsal side, and consequently I described them under that name in my former publication; but as they are internal or nearer to the mandibles than the other pair of similar processes, I now believe them to be analogous to the inferior labial processes in the female, notwithstanding their superior position. The fold of the integuments connecting those processes at the central side to another in the mesial line divides in two plates; the exterior adhering to the commissure of the external digitations already described; the interior united to the covering of the mandibles. Between those two plates a pair of depressed cushion-like parts is placed, coming in contact to another in the middle, and nearly wholly adherent at their inferior surface to the inner plate. They have nearly 8 lines in length and $4\frac{1}{2}$ in breadth. Their free, superior and internal margin is divided by incisions in ten or eleven small tetragonal parts; the right part having eleven, the left ten of those digitations. The relative position seems to prove them to be analogous to the folds between the internal labial processes, which are considered as the olfactory apparatus by Prof. Owen. I believe they afford an additional argument against this opinion, because they are doubtless only rudimental digitations.

Beneath those internal labial processes there is at each side outwards to them a fold in the inner surface of the external circle of digitations. At the right side a processus is exerted from this fold;

* Tijdschrift voor de natuurkundige Wetenschappen, uitgegev. door de eerste Kl. v. h. Koninkl.-Nederl. Instit. i. 1848, p. 67-75. A short abstract of this description was communicated by me at the Oxford Meeting (1847) of the British Association, and is inserted in the Report of the Seventeenth Meeting of the British Association; London, 1848; Transactions of the Sections, p. 77.

it consists of the conjunction of the sheaths of four tentacles; three of those tentacles are placed on a common flat expansion; the fourth is contained in a separate slip, placed beneath the three other tentacles. At the left side, instead of this external labial processus, there was a great conoid body, the length of which was nearly $2\frac{1}{2}$ inches; this part was laterally compressed; at the basis its measure from the dorsal to the ventral side was found to be 1 inch 10 lines; from the right to the left side only 1 inch. This part was proved to me by dissecting it to be formed by the union of four unusually developed tentacular slips, one of which was shorter and more free, the three other chiefly composing the singular body. This part occupied a great space in the interior of the circle, which was formed by the external tentaculiferous digitations of the head, and perhaps its great development may have been the cause of the more imperfect condition of the other three labial processes.

I regret that this specimen was in a bad state of preservation; its abdominal sac being dilacerated and the viscera destroyed by maceration. Hence I am not able to give a description of the male organs of generation, but that the specimen was a male seems to me unquestionable. At the same place where in other specimens the vulva adheres to the ground of the branchial cavity, was a short conic part, evidently the penis, somewhat bent at the basis towards the ventral side, having an obtuse and perforated top. A very narrow canal was found to go from this aperture to the root of the penis, and to expand there in a pouch, of a firm parchment-like texture. This bladder contained a conglobate tube of a brown colour, having a little more than 1 line in diameter. The length of this tube could not be determined, because, by any attempt to unravel it, it broke into pieces. Microscopic investigation proved that this tube was formed by two membranes, the external transparent, the inner thicker, coloured, brittle, and offering circular stripes or fibres. In the interior of the tube there was a thread or band, coiled up in a spire with close circunvolutions, like the spiral fibre of the *tracheæ* of insects. This fibre was not of exactly equal broadness in its whole extent; its broadest parts had a diameter of nearly $\frac{1}{48}$ th of a line. This fibre seemed composed of an external transparent membrane, including an internal part of a yellowish brown colour. Between the fibre and the tube containing it were observed several free microscopic parts; some greater, of a brown colour, oblong or navicular; some smaller, uncoloured, and still of different size. How different this conglobated tube, contained in the spermatic vesicle, may be from the *Needham-machines* or spermatophores of other Cephalopods, I still believe that we ought to consider it as a similar sperma-containing apparatus. It seems highly desirable that a travelling naturalist may have the opportunity of observing the male Nautilus in a recent state.

Imperfect as they are, I trust those last observations to be still of some interest for comparative anatomy, as giving the first account of that which seems now to be the chief *desideratum* in our knowledge of the Nautilus, the disposition and structure of the male generative apparatus.

EXPLANATION OF THE FIGURES.

(Published in the Transactions Z. S. vol. iv. Pl. 5-8.)

Fig. 1—8 belong to the female *Nautilus*; fig. 9—14 to the male specimen, which is described at the end of my memoir.

Fig. 1. A female *Nautilus* in its shell, from the left side.

Fig. 2. The same specimen seen from above, and taken out of the shell.

Fig. 3. The same, from below.

The following letters indicate the same parts in those three figures: *a*, the hood; *b*, the eye; *c c*, the digitations; *d*, the funnel; *fff* *i*, the mantle; *i'*, its visceral part; *f'*, the dorsal fold of the mantle; *g*, the aponeurotic insertion of the shell-muscle.

In figs. 1 and 3, *h* indicates the place where the laminated gland is situated. In fig. 2, *h h h* are three aponeurotic inscriptions on the visceral sac; *j* is the siphon.

Fig. 4. Branchial cavity and funnel of the same. *f*, funnel; *g*, mantle, reflected; *e e*, shell-muscles; *h h*, first pair; *h' h'*, second pair of branchiæ; *a*, anus; *b*, vulva; *c*, caruncle at the root of the first branchia; *d*, two pair of similar papillæ at the bottom of the branchial cavity. 1, 2, 3, three pair of slits (at the left side of the figure the first is to be seen; the two others are represented on the right side of the figure).

Fig. 5. Side view of the head, the mantle *f* being reflected: *a*, hood; *b*, eye; *c c*, digitations; *d d*, funnel.

Fig. 6. The same, after removing the digitations; *e e*, transverse sections of their tentacles; *k k*, external labial processes; *l*, internal ditto; *m*, membrane covering the mandibles.

Fig. 7. The same, after removing the external labial processes, cut off at *k k*.

Fig. 8. Caruncle at the peduncle of the eye; organ of smell, *a*.

Fig. 9. Head of a male *Nautilus* seen from above; the hood has been divided by a longitudinal section; *g g* are the internal labial processes; below them, at the right side, is placed and partly visible at *i*, the external labial process. The place of it occupies at the left side a large conoid body, *a*; *m m* is the fringed lip inclosing the mandibles.

Fig. 10. The conoid body of the foregoing figure, separately seen from the inner surface, together with the incumbent internal labial process of the left side.

Fig. 11. Lateral view of the internal labial process of the right side, with the mandibles and the surrounding lip.

Fig. 12. View of the inferior surface of the muscular mass of the mouth, with the two cushion-like incised bodies, representing here the folds between the internal labial processes.

Fig. 13. Penis. *B*, a longitudinal section of it.

Fig. 14. A portion of the circumvolved spermatophore or tube contained in the bladder at the basis of the penis.

Leyden, 8 Dec. 1849.

2. DESCRIPTION OF A NEW GENUS OF BATRACHIANS FROM SWAN RIVER. BY DR. H. SCHLEGEL, CURATOR OF THE ROYAL ZOOLOGICAL MUSEUM, LEYDEN. (EXTRACTED FROM A LETTER TO J. E. GRAY, ESQ.)

“The following notice I hope is sufficient to give an idea of a new Toad which was discovered at Swan River by Dr. Pries:—

“*MYOBATRACHUS*, n. g.

“Tongue small; no teeth except two small horizontal fangs in the intermaxillary bone; eustachian tubes separated, opening behind the eyes. Legs short, enveloped at the base in a duplicature of the skin

of the sides of the body. Fingers 4, the second longest; toes 5, cylindrical, tapering, not armed. Eyes lateral, middle-sized.

“MYOBATRACHUS PARADOXUS.

Above brownish grey, beneath greyish.

Hab. Australia; Swan River. Mus. Leyden.

The Prince of Canino has made for this animal a family, which he has named MYOBATRACHIDÆ.”

Mr. Gray observed, that a toad which he described and figured in Capt. Grey's Travels in Australia, under the name of *Breviceps Gouldii*, agrees with the animal described by Dr. Schlegel in all particulars, and especially in possessing the two horizontal horny appendages on the intermaxillary, which Dr. Schlegel described as horizontal fangs; they are partly sunk into the integument of the palate. Admitting the propriety of the proposed generic distinction, the animal will therefore now stand in the catalogues as *Myobatrachus Gouldii*.

The presence of the teeth in the intermaxillary separates this animal from the *Breviceps* of South Africa.

3. DESCRIPTIONS OF SOME APPARENTLY NEW SPECIES OF LONG-CORN COLEOPTERA IN THE COLLECTION OF THE BRITISH MUSEUM. BY ADAM WHITE, F.L.S., ASSISTANT IN THE ZOOL. DEPT. BRIT. MUS.

(Annulosa, Pl. XIII.)

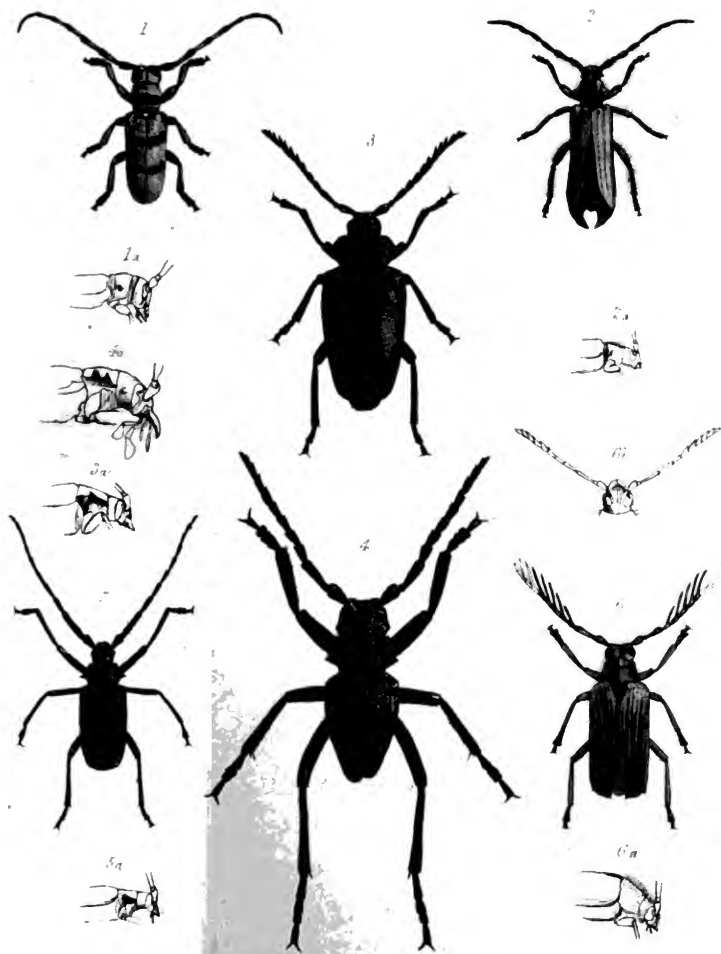
PRIONACALUS ATYS. Pl. XIII. fig. 4.

In the ‘Annals and Magazine of Natural History,’ vol. xv. p. 108, I have described under the name of *Prionacalus Cacicus*, a curious genus from Mexico, allied to *Psalidognathus*, G. R. Gray. I regarded the two specimens as male and female of the same species, but it would seem that they are both males, and as they are considerably different, must be different species; what was deemed the male may retain the name *Prionacalus Cacicus*; it is figured on plate 8. fig. 1. of the above volume. The other specimen may be named *Prionacalus Iphis*; it is figured on plate 8. f. 2. Since the above we have received a third species from the Andes of Peru, where it was found by Prof. Jameson of Quito; the following short specific characters may distinguish the three:—

P. CACICUS.

Head behind the eyes without a prominent spine, the lateral margin behind, produced into a slight process directed backwards; a strong crested ridge over each eye, at the end directed outwards; antennæ, palpi and legs rufous, antennæ blackish at the base; jaws, excepting at the end and on the edges (where they are smooth) roughly punctured: head, thorax and elytra, at the base, somewhat roughly punctured, the elytra more delicately punctured towards the end.

Hab. Mexico.



1 LAMIA (CEROSTERNA) TRIFASCIELLA 2 BIMIA BICOLOR 3 COLOCOMUS MOROSUS
4 PRIONACALUS ATYS 5 PYRODES TENUICORNIS 6 CALLOCTENUS PULCHER

P. ATYS.

Head midway between the eyes and the hind margin, with a small wide spine; a slight, crested, straight ridge over each eye, the space between slightly grooved; antennæ thickish. In colour it is of a dark pitchy brown; the apex of the elytra somewhat ferruginous; legs pitchy brown; tarsi and tips of tibiæ ferruginous; palpi of a clear ferruginous: sculpture much as in last.

Hab. Andes of Peru.

P. IPHIS.

Deep black, coarsely punctured and rugose; antennæ at the ends, palpi, tibiæ at apex and tarsi reddish; head midway between the eyes and hind margin, with a strong wide spine on each side; head with the two keels over the eyes short and straight, the space between them deeply grooved.

Hab. Mexico.

CALOCOMUS MOROSUS. Pl. XIII. fig. 3.

Antennæ ferruginous, black at the base; 13-jointed, very strongly serrated on the outside, the terminal joint deeply notched, nine at least of the terminal joints with the outer edge elongated at the tip: head, thorax, scutellum, abdomen and legs pitchy black; head, thorax and scutellum thickly punctured; elytra thickly and finely punctured, the punctures of the base coarser; elytra wide, shorter than the abdomen, ferruginous, in some places darkish brown.

Hab. Bolivia. From the Collection of Mr. Bridges.

This makes the fourth species of *Calocomus*, a genus which seems, like some of the other *Prionidæ*, to be very variable in the number of joints in the antennæ; the type *C. Desmarestii* has eleven joints; this species has thirteen; while the *Calocomus Lycius*, and *C. Kreuckelyi*, described by M. Buquet, have no less than twenty-two.

PYRODES TENUICORNIS. Pl. XIII. fig. 5.

Head and thorax deeply, coarsely and irregularly punctured, washed with golden green, in some lights tinged with a deep purplish rufous; jaws golden green, tips and edges pitchy; antennæ with the first joint flattened above, golden green except at the end, which is bluish green; third joint much elongated, as long as the fourth and fifth taken together; the first six joints punctured, base of the seventh punctured, tip of the seventh joint and the whole surface of the terminal four grooved. Elytra varied with green and purplish red, much depressed, the margin and shoulders lively green; scutellum notched at the end, slightly grooved down the middle, and with a patch of coarse punctures on each side of the groove. Under parts green with æneous reflections.

Femora green and covered with minute crowded warts; tibiæ and tarsi light rufous, the tibiæ with elongated papillæ and short hairs.

Hab. Mexico.

Of this species there are two examples in the Museum; in the one figured a purplish red tint pervades all the joints of the antennæ but

the first, and extends over the whole elytra excepting on the basal margin and the extreme edge, which are green.

This species seems to link the three genera *Pyrodes*, *Mallaspia*, and *Solenoptera*; it agrees in most particulars with *Pyrodes*.

PYRODES SMITHIANUS.

Scutellum considerably elongated at the point and notched at the base, the shoulder and the elytra close to the scutellum are produced, and near the shoulder there is a deep groove. The head and thorax are rather smooth and closely punctured; the front margin of the thorax is slightly notched in the middle; the scutellum is quite smooth on the edges, down the middle, and at the tip; the elytra are roughly punctured, the punctures often running together and forming characters like letters; there are four longitudinal ribs down each, which are branched at the end.

This *Pyrodes* is of a bronzy copper colour, the tibiae and most of the joints of the antennae being tinged with purple.

Hab. Brazil.

A specimen was found by J. P. George Smith, Esq., of Liverpool, on Caripi, an island thirty miles from Para: he presented it, with numerous other fine insects, to the British Museum.

CALLOCTENUS, n. g.

Body small, the elytra extending over its side and considerably beyond its extremity. Head much excavated in front. Eyes large and prominent. Thorax with a distinct tooth on the sides a little beyond the middle. Scutellum of an elongated triangular form, pointed at the end. Elytra spined at the suture and at the end of the lateral margin.

Antennae in the male pectinated from the fourth joint, in the female serrated from the fifth: in the male the first joint is of the same length as the fourth exclusive of the appendage; the third is considerably elongated and with a protuberance at the end; from the fourth to the eighth the end is furnished with a compressed appendage narrow at the base, dilated afterwards and blunt at the tip (the ninth and other joints broken off). Antennae in the female with the terminal joints depressed, oblique at the end, so that the inner edge is serrated. Legs moderate, simple, without serratures. Elytra spined at the suture and at the end of the lateral margin.

This genus comes between *Pacilosoma* and *Anacolus*.

CALLOCTENUS PULCHER. Pl. XIII. fig. 6.

Hab. Venezuela.

Head, thorax, scutellum and under side of body of a dark coppery green, the head and thorax rather thickly covered with soft greyish yellow hairs; elytra with three longitudinal, considerably raised keels, between each of which is a slighter keel; in the male these latter are abbreviated, between the keels the elytra are closely punctured; the elytra in the male are of a brownish yellow, the punctured parts, except at the base, being darker in colour; in the female the elytra are

of a clear ochre yellow ; in the male the antennæ are of a dull ferruginous, the base of the joints paler ; the legs are ferruginous in the male, while in the female they are of the same dark coppery green as the head and thorax.

In a female specimen the elytra are of a very dark olive-green ; the specimen is rather larger than the other.

Sent from Venezuela by Mr. David Dyson of Manchester.

BIMIA, n. g.

Head as wide as the thorax in front, somewhat narrowed behind, in front square and nearly perpendicular, grooved down the middle ; jaws short and strong ; eyes deeply notched for the insertion of the antennæ, the hinder margin widely sinuated.

Antennæ 11-jointed, shorter than the body ; first joint clavate, cylindrical, slightly longer than the third ; second joint small, moniliform ; third, fourth and fifth joints straight, compressed, and nearly of the same length ; the sixth slightly bent and compressed ; the five last joints compressed and gradually smaller, the last blunt at the tip. Thorax wider than long, with a strong spine on each side about the middle, its disc depressed and slightly unequal. Scutellum largeish, hollowed slightly in the middle. Elytra rather narrow, not so long as the abdomen, soft, not meeting except at the base ; the shoulders prominent, the sides nearly parallel, the ends slightly pointed ; the wings large, and extending beyond the elytra and abdomen. Legs strong, slightly compressed ; femora somewhat thickened ; hind legs, if extended, would reach a little beyond the abdomen. Tarsi scarcely wider than the tibiæ ; penultimate joint deeply cut ; soles densely covered with short hairs.

This genus would seem to be placed not far from *Molorchus*, and may be allied to *Agapete*, Newman, Zoologist, iii. p. 1017 : it is not unlikely that the other sex is very different in form and colour ; there is only one specimen in the Museum.

BIMIA BICOLOR. Pl. XIII. fig. 2.

Hab. Australia (Perth). From the Collection of Mr. George Clifton.

The body is of a very deep shining black, closely punctured, and furnished with short hairs ; head below and in front yellow, the yellow colour extending triangularly between the antennæ ; eyes, antennæ, cheeks and vertex black ; thorax yellow, with a black band down the middle, contracted behind ; scutellum black ; legs of same deep black as the abdomen, a wide yellow ring on the front tibiæ near the top ; elytra pale ochre yellow, with three or four longitudinal veins which branch towards the tip ; wings long and black.

LAMIA (CEROSTERNA) TRIFASCIELLA. Pl. XIII. fig. 1.

Densely covered with short yellow and black hairs ; head yellow, an impressed line along the middle free from hairs ; antennæ with the two first and four last joints black, the other joints yellow at the base and black at the tip ; thorax yellow ; spines and a band connecting them black, the band crenated in front ; legs yellow, joints, tarsi

and posterior side of second and third pairs of femora black; scutellum at the end covered with yellow hairs; elytra of a clear ochre yellow, the base from the shoulder to the suture edged narrowly with black; a transverse black band before the middle, nearly but not quite touching the edge and the suture, widest toward the suture; another transverse black band just behind the middle, and neither touching the edge nor the suture, narrower than the first band, and, like it, waved both in front and behind.

Hab. China (Hong Kong). John Bowring, Esq.

This seems allied to the *L. Assamensis*, Hope. In the present unsettled state of the Longicorn Coleoptera it would be rash to found genera on mere isolated species; but it is difficult to refer the present to any of the modern genera; it comes perhaps nearest to *Cero-steria*.

The figures represent the insects of the size of nature.

January 22, 1850.

Matthew Truman, Esq., M.D., in the Chair.

The following papers were read:—

1. DESCRIPTION OF A NEW SPECIES OF CHRYSODOMUS,
FROM THE MOUTH OF THE MACKENZIE RIVER.

By J. E. GRAY, Esq., F.R.S. ETC.

(Mollusca, Pl. VII.)

Sir John Richardson, M.D., on his return from the Arctic searching expedition, kindly presented to the Museum a series of shells which he had collected between the mouth of the Mackenzie River and Cape Parry: several of them were broken by the extreme cold during the wintering of the expedition at Great Bear Lake.

The collections consisted of the new *Chrysodomus* here described, and the following species, which are exactly similar to the species brought home by Ross, Parry, and the other arctic voyagers from Baffin's Bay, and are interesting as showing that these species are found more than half-way towards the Northern Pacific Ocean; viz.

Saxicava arctica. Very like *S. rugosa*, but larger.

Hiatella arctica. Very large size, with the hinge-teeth almost entirely obliterated.

Mya truncata.

Glycimeris siliqua. All young.

Cardium Grœnlandicum. On the shores.

Crassina semisulcata, Leach, not Müller. In the mouth of the river: eaten by the birds.

Buccinum glaciale.

The egg of a large species of *Natica* was abundant on the sands, probably *N. ampullaria*, Lamk.?



THE COLOMBUS HERMOS

CHRYSODOMUS HEROS. (Mollusca, Pl. VII.)

Shell elongate; spire conical, longer than the mouth; whorls convex, two or three upper with a strong central keel, rest with irregularly placed distant rounder tubercles, the last rounded, not keeled; throat white.

Var. 1. Whorls as with a strong, central, continuous keel; the last slightly nodulose.

Egg-cases ovate-oblong, erect, on an expanded base, contracted beneath; surface deeply punctated, granular.

Inhab. Arctic Ocean.

This shell is very like *Chrysodomus despectus*, but differs from that species in the form and surface of the egg-cases, as well as by the greater convexity of the whorls, and the strength and angularity of the keel on the upper whorls.

Like the other species of the genus, the white, opaque, outer coat of the shell is very much inclined to separate from the inner or central coat, which presents, where the outer coat is removed, a smooth surface of yellowish or brown colour.

Dr. Richardson observed several specimens of this shell in the sand-hills which edge the coast, some distance from the sea.

I have named this species *Heros*, as being finest of the genus, and in commemoration of the enterprise and heroic conduct under great hardship of its discoverer.

2. REMARKS ON THE MORPHOLOGY OF THE VERTEBRATE SKELETON. BY EDWARD FRY.

The objects of the present paper are,—1st, the brief statement of the probability that there are laws which govern animal form, in addition to the law of final causes; and 2nd, the *à priori* discussion of certain propositions about the vertebrate skeleton; being an attempt to illustrate the vertebrate by some invertebrate forms, and thus to show their unity of plan.

SECTION I.

The existence of laws governing animal form is rendered probable by the discovery of such laws as regards the forms of plants, all whose parts may be referred to a leaf as the fundamental archetype, as is shown not only by the correspondency in many normal conditions, but also by the transmutations of parts, and the monstrosities to which the petals, sepals, stamens, &c. are liable. Though the greater simplicity of plants, and the more numerous monstrosities to which they are liable by nature or art, render the existence of laws of the kind spoken of more readily apparent in them than in animals, the nature of the proofs and of the conclusions are alike in both cases.

It may, secondly, be remarked, by way of showing a general probability for such a scheme, that there exist unities of structure both in different animals and in different stages of development of the same animal, which are independent, so far as we know, of unity of

end; or, in other words, that final causes do not explain all the affinities and resemblances which we are able to trace*.

And again, it must be observed, that those remarkable likenesses, which are observable in many or all animals, between their various forms and conditions up to maturity, on the one side, and the various members of the animal kingdom up to their own position in the scale, on the other hand (so that, for instance, man passes through forms resembling, but not identical with, those of many animals from the lowest monad up to his own position in the scale), are inexplicable on the theory that the forms of animals are regulated by final causes only; but are in perfect accordance with that other which holds that there is expressed in the structure of animals some abstract idea, which running through all the frame, and modified to all purposes of need, and manifested in all variety of conditions, is yet one and the same.

It must be admitted that the force of these arguments may, to some extent, be barred by an assertion which it is difficult fully to answer, viz. that our ignorance of final causes is so great as to allow us no room to argue on the existence of other causes from their apparent inadequacy; nevertheless as the other supposition seems to have in it no improbability, but as I think the contrary, it may be admitted as at least what best suits our present knowledge.

The belief in the existence of other laws of organization besides that of final causes does in no wise lessen or obscure the argument of natural religion derived from it, which was advanced with great pertinency by the ancient Stoical philosophers, and has been amplified by Derham, Paley and others in our own country.

I now proceed to the second portion of my paper.

SECTION II.

There are reasons derived from the structure of animals below the Vertebrata which might induce us to expect that the vertebrate skeleton should be composed of elements of a common character.

1. So soon as the nervous system assumes the form of a line or chain down the body of the animal, the whole structure puts on a segmental or annular arrangement. Thus in the Annelida the body consists of numerous segments, similar one to the other, with the exception of the anterior one or head, which is sometimes slightly different in form, but in other instances only distinguishable by the presence of a mouth. Each segment has its proper nervous ganglion, connected by two fibrous commissures with those of the neighbouring division.

2. But these segments are subject to change. Thus the *Polydesmidae*, a family of the Myriapoda, exhibit the posterior part of the body composed of segments similar to those above described, whilst in the anterior part each segment is the result of the coalescence of two original ones. In the Chilipoda, the same process has

* This part of the subject has been fully illustrated by Prof. Owen in his various writings.

gone on further; so that all the apparent segments are thus composed by the anchylosis of two original ones at an early period of growth, as proved by the two pair of legs which each one bears, and the double nervous ganglia which they contain, the nervous centres of the original elements having approximated to one another without coalescence (Newport on Myriapoda, Phil. Trans. 1843).

3. But not only does the progression from lower to higher forms in the scale of the animal kingdom teach us how segments of the body originally similar may be changed—the progression of individuals does the same thing. The larval condition of insects undoubtedly corresponds very nearly with the Annelida; the arrangement of the body and the relation of each segment to the nervous system are similar. But the perfect state shows a very great modification in the form; many segments have disappeared by coalescence, whilst the equality of size originally existing between them has been lost by reason of the centralization of functions; the nervous centres have often been removed from their respective segments, yet the number remains the same; for although only nine centres appear in the abdomen (Blanchard sur les Coleoptères, Annales des Sciences Naturelles, 1846, part i.), yet the last has been shown in the Lepidoptera (Newport on *Sphinx*, Phil. Trans. 1832) to consist of two which have united.

4. The same segmental arrangement of the body, and the same ganglionic condition of the nervous centres in accordance with the rings of the body, obtain throughout many members of the class of the Articulata.

We now descend to two more particular propositions, resulting from and embraced in the foregoing, but which we nevertheless prefer to illustrate separately.

There are reasons to expect that the head of the Vertebrata should be composed of segments similar to those of the body.

1. We have already noticed the close resemblance between the anterior segment or head and the following ones in the *Polydesmidae*.

2. In the larval insects the similarity is great; but in the perfect one a number of the other segments become anchylosed, and enter into the composition of the head, in accordance with the law, that the more perfect an animal is, the more complex and individualized are its parts, and consequently the more is its abstract nature hidden under its teleological manifestation. The divisions between the segments entering into the composition of the head sometimes remain permanently recognizable in the external skeleton. The number of these segments has been a much-vexed question among entomologists, the numbers advocated by different naturalists having been two, three, four, five and seven. I am inclined to believe the real number of these segments to be four:—1st, because of the very slight evidence for the presence of any other, the fifth segment being considered as entirely atrophied, and no corresponding manducatory organ appearing; 2nd, from four being the only number at all discoverable in some insects, as in the *Hydrous piceus* (see Newport on Insecta in Todd's Cyclopædia); 3rd, because the brain (*i. e.* the coalesced

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ganglia of the cranial segments) of the *Necrophlagæophus longicornis* has been discovered by Newport, at the period of its bursting its shell, to consist of four double ganglia (Newport in Phil. Trans. 1843).

We next consider the reasons for supposing *that the organs composing the mouth of the Vertebrata should be the homologues of those of locomotion*. It must be remarked, that everything now to be said assists most strictly in support of the preceding proposition, and would have been introduced under that head but for the sake of convenience in illustrating the vertebrate skeleton.

1. In the Crustaceans the jaws differ in scarcely any other character than size from the true legs used in locomotion.

2. In the Myriapoda the members of the basilar segments of the head are jointed and retain the form of true legs, but are used for prehension (Newport in Todd's Cyclopædia).

3. In Insects the tarsal joints of the cranial legs are undeveloped; the femur and coxa are small or confluent with the under side of the segment, whilst the tibiæ are alone enormously enlarged, and thus become elements in the complex mouth of Insects; their muscles, however, being attached to the basilar and posterior lateral parts of the head, just as if they still subserved the purposes of locomotion (*idem*).

4. All the parts of the complex mouth of Insects are thus referable to the segments of the head. In the Great Water Beetle this is clearly shown; the manducatory organs visibly resemble the proper organs of locomotion, and are articulated to the distinct segments (*idem*).

5. We must remark intermediate normal conditions between the true locomotive and manducatory form of leg; as in the genus *Onitis*, where the prothoracic legs are without tarsi, and the tibiæ are terminated by sharp hooks; and in the *Bubos bison*, a species of a neighbouring genus, where the tibiæ strongly approach in form the proper mandibles of the head; also,

6. A monstrous condition in a specimen of *Geotrupes stercorarius*, where the prothoracic legs were arrested in development and the tarsi were absent, so that they very closely resembled the form of the mandibles (*idem*).

SECTION III.

The spinal cord of the Vertebrata is homologous with the ganglionic cord of the Articulata.

1. The elements of the systems are alike, being in both cases cellular nervous matter and commissural fibres.

2. The experiments and investigations of recent physiologists have proved the real independence of the segments of the cord contained in each vertebra, inasmuch as each performs separately from the others its own reflex actions, just as is the case in the ganglionic cord of the Articulata; so that, as far as its reflex actions are concerned, the cellular or dynamic element of the spinal cord is not one organ or centre, but a series of independent organs or centres, as is seen in

the Insects, the external longitudinal fibres serving only as commissural or communicating portions.

3. Those ganglia of the Insects which are perfectly separate in the larval condition often exhibit a tendency to fusion in the perfect condition (Blanchard *ut antea*). Thus in the Coleoptera the last abdominal ganglion is always formed by a fusion of several original ones; the first and second abdominal often form a single mass with the metathoracic, whilst in the Chafer this last is united with the mesothoracic (*idem*). In like manner the fourth and fifth segments in the perfect insect are fused together. In the *Polydesmidae*, the two first segments which bear legs unite their nervous centres with the first subesophageal, so as to form a short cord similar to that of the Ostracion and some other fish (Newport on Myriapoda, Phil. Trans. 1843). In the Scorpion the fusion has gone so far as to form a sort of medulla oblongata, giving rise to eight pairs of nerves (*idem*). In *Nitidula aenea* all the abdominal ganglia have united to form a short cord (Blanchard *ut antea*, plates); and in *Calandra palmarum* the ganglia of the whole body have approximated so as to form a continuous moniliform cord (so far ganglionic in appearance as that the distinction between the segments has not been obliterated), which is placed in the anterior portion of the body (*idem*, plates).

4. The ganglionic cord of Insects undergoes the same alteration at its posterior extremity that the spinal cord of the Vertebrata does by its withdrawal from the caudal vertebræ and the formation of a cauda equina, as may be clearly seen in Blanchard's plates (*ut antea*, e.g. in the *Nitidula aenea*, the *Calandra palmarum*, and the *Dyticus marginalis*).

5. In the Chilognatha, or higher order of the Myriapoda, the ganglia coalesce so as to form a uniform spinal cord, the commissural fibres no longer occupying intervening spaces as in the Chilipoda, but forming the external layer of the nervous cord (Newport on Myriapoda, Phil. Trans. 1843):

6. Whilst the true vertebrate fish *Orthogoriscus mola* exhibits exactly an opposite character in the ganglionic condition of its myelon (Owen's Lectures, ii. 173, on the authority of Arsaki).

SECTION IV.

A vertebra is the correlative in the osseous of a centre in the nervous system.

This appears to me to be the most general possible definition of a vertebra, and therefore the most philosophical. The general idea of the relation of the osseous and nervous centres involved in it, though not the relation of the segments of each one to the other, was thus expressed by Oken: "Bones are the earthy, hardened, nervous system; nerves are the spiritual, soft, osseous system—*Continens et contentum*" (quoted by Owen, Report of Brit. Assoc. p. 242).

1. The number of vertebræ constituting the spinal cord always corresponds with the number of segments in the cord as indicated by

the number of pairs of nerves given off. When more than one pair perforate one piece of bone, it results from an ankylosis of several vertebræ, as in the sacrum; and the coccygeal vertebræ, which appear to be an exception to the definition, are not so in reality, the spinal cord passing into them in the fetal condition, and being gradually withdrawn just in the same manner as is the case in some of the Coleoptera. As is clearly seen in them, too, the cauda equina represents the nerves of the vertebræ from which the cord has been withdrawn. Some Vertebrata, as *e.g.* the Python, retain the original relation of the vertebræ and centres throughout the whole of the spinal cord (Owen, Report *ut antea*, 221).

2. The same dependence of the vertebræ on the nervous centres is shown by the fact, that the tail which is reproduced by Lizards, in the case of the loss of that member, is a single bone, because although bone may be reproduced, the spinal cord cannot be (Owen *ut antea*, 254).

3. In accordance with this definition may also be cited the very long vertebra which is formed on that part of the spinal cord of the Anurous Batrachians which does not give off nerves, and which is not the result of ankylosis of several elements, but arises from one point of ossification (Martin St. Ange, *Recherches anatomiques et physiologiques sur les Organes transitoires et la Métamorphose des Batraciens*, Ann. des Sci. Nat. No. xviii. p. 401); and also the invariableness of the number of the vertebræ in the Mammalian's neck, resulting from the presence of the same number of nerves, and irrespective of the length of the vertebræ.

SECTION V.

A segment is the representative in the Articulata of a vertebra in the Vertebrata.

This view has been advocated by Geoffroy St. Hilaire, both in his "Mémoire sur la Vertèbre," in the ninth volume of the 'Mémoires du Muséum d'Histoire Naturelle,' and previously in a memoir read by him before the Academy in 1820. Nevertheless, the argument on which I would mainly rest it, is not yet universally admitted, for we find M. Emile Blanchard very recently asserting that nothing really indicates the analogy between the spinal cord of the Vertebrata and the ganglia of the Articulata.

1. We have seen what a close relation of correspondence exists in the Articulata between the segments and the ganglionic nervous centres; and we have endeavoured to prove that in the Vertebrata a vertebra is the correlative of one of the spinal nervous centres; and also that the spinal cord of the one class is the representative of the ganglionic cord of the other; whence it appears, that a segment of the Articulata and a vertebra of the Vertebrata must be homologous.

2. The ossification of the centrum of a true vertebra is first peripheral, and subsequently fills up the interior with osseous matter (Owen *ut antea*, 256). Thus if we suppose a vertebra stopped in the first stage, and forming the external instead of the internal sup-

port of the body, we have a segment of an articulate creature, with only an histological difference, which must by no means be allowed to conceal from us the true nature of a part (Geoffroy St. Hilaire, *Sur la Vertèbre, ut antea*, p. 92).

3. If to this view it should be objected, that the including in the one case what is excluded in the other dispels all semblance of homology, it must be answered—

a. That notwithstanding this difficulty, the general homology of the vertebrate and articulate skeletons as wholes has long been admitted, though this more particular one of their parts has not been.

β. That the hæmal arch of the Vertebrata, whose normal office it is to enclose the main blood-vessels of the body, and which office it exclusively performs in many cases, is yet in others so developed as to enclose a mass of viscera, viz. in the thorax.

γ. In the Testudina we have an example of those vertebral elements which are usually internal, becoming external, and including not only all the viscera, but having the whole muscular system attached internally, as in the Articulata, and even the limbs arising from the inside instead of the outside of the thorax.

4. It presents no difficulty that the segments of the Articulata have no superior or inferior arches like vertebræ, because both the spinal cord and circulatory organs which those arches are respectively designed to protect are included within the body (St. Hilaire *ut antea*, p. 102).

5. To the order of development of a vertebra in the lateral processes for locomotion being produced subsequently to the body, we have an analogous case in that the Myriapoda are at birth and for some time afterwards apodal, and subsequently acquire their numerous legs (Newport on Myriapoda, *Phil. Trans.* 1841). This is also the case with some other articulate animals.

SECTION VI.

The brain of the Vertebrata is a modification of a series of four ganglia homologous with those of the spinal cord.

1. In the *Amphioxus* that part of the cord which must be regarded as the homologue of the brain, because it gives off five pair of cephalic nerves, is only distinguished from the other part of the cord by its pointed anterior extremity, its posterior part being entirely like the other ganglia; even its greatest vertical diameter is not greater (De Quatrefages on *Amphioxus*, *Annales des Scien. Nat.*, third series, vol. iv.).

2. We have already noticed that the two large cephalic ganglia of the Centipede are the result of the coalescence of a series of four ganglia, as they appear in the fetal condition, each of these nervous centres supplying nerves to the senses. Closely corresponding with this arrangement is that displayed by many of the fish, as *e. g.* the Eel, where the brain is only a series of four closely arranged ganglia. And this same original scheme seems to me traceable throughout all the Vertebrata to man himself. There are, however, as the great

centralization and individuality of the organ would lead us to expect, many variations and modifications, which tend at first sight to conceal its real nature, as *e. g.* the removal of the olfactory ganglia to a great distance from the other elements of the brain, with which they only maintain their connexion by means of filiform crura, as in the Whiting and many fish; the amplification of the segments of the encephalon by the addition of supplementary ganglia, as the hypophysis, hypophysis, &c. as they occur in many fish, and some of which are retained in the higher orders, or the cerebrum in the cartilaginous fishes, and in all animals upwards to man, and which comparative anatomy teaches us is only to be considered as a special appendage to or development of the prosencephalic ganglia; or the extreme development of one pair of ganglia so as to obscure the others, as the cerebellum in the Sharks, Sawfish, &c. (Owen's Lectures, ii. 175); or the very diminutive size of a segment, as the cerebellum in many reptiles; or the coalescence of the pair, and consequent obliteration of the mesial division, just as is equally the case between the two halves of the spinal cord, as in the cerebellum.

3. Embryonic anatomy, too, comes in to strengthen the conclusion of comparative anatomy, that a series of four ganglia is the essential element of the brain, and that all the other parts of which it consists in adult life of the higher Vertebrata, including of course the cerebrum, are superadded.

The argument of the preceding sections, exclusive of Section I., and the conclusion to which it is intended to lead, may thus be stated:—

Considering that the head of the Insecta, Myriapoda, &c. is composed of a series of segments serially homologous with those of the body, as its brain is of ganglia serially homologous with those of the cord; that a vertebra is the general homologue of a segment as the spinal cord is of the ganglionic cord; and that the brain of the Vertebrata consists of a series of four segments; there appears a strong probability that its head in like manner shall consist of a series of four vertebrae.

3. MONOGRAPH OF THE SPECIES OF MYOCHAMA, INCLUDING THE DESCRIPTIONS OF TWO NEW SPECIES FROM THE COLLECTION OF H. CUMING, ESQ. BY ARTHUR ADAMS, R.N., F.L.S. ETC.

(Mollusca, Pl. VIII.)

MYOCHAMA, Stutchbury.

Testa inæquivalvis, adhærens; valva affixa dentibus duobus marginalibus, divaricatis, ad umbonem disjunctis, foveolâ trigonâ intermedîâ alteram testaceâ appendicis extremitatem, cartilagineâ cornuâ connexam, excipiente; valva libera dentibus duobus inæqualibus, parvis, divaricatis, alterâ appendicis extremitate foveolæ intermedîæ insertâ; umbones valvæ liberæ internè, alterius externè, recurvi; impressiones musculares duæ orbiculares,

distantes, laterales; impressio muscularis pallii sinu brevi lato; ligamentum tenue externum.

Shell inequivalve, adhering; the attached valve with two unequal diverging marginal teeth, separated at the umbo by a triangular pit in which one end of a testaceous appendage is inserted and connected by a horny cartilage; the free valve with two unequal, small, diverging teeth, close under the umbo, in which is inserted the other end of the testaceous appendage; the umbo of the free valve is curved inwards, that of the fixed valve outwards; muscular impressions two, nearly orbicular, distant, lateral; pallial impression with a short broad sinus.

MYOCHAMA ANOMIOIDES, Stutchbury. *M. testâ rosed, tenui, fragili, costis prominentibus radiantibus dichotomis; valvâ liberâ valdè convexâ; umbone extra apicem valvæ alterius producto; epidermide tenui pellucidâ.*

Long. $\frac{1}{2}$; lat. $\frac{5}{12}$; alt. $\frac{9}{12}$.

Hab.

Shell rose-coloured, thin, fragile, ornamented by prominent radiating dichotomous ribs; free valve extremely convex, the umbo projecting beyond the apex of the other; epidermis thin and transparent.

Hab.

This species is always regularly radiately ribbed, but when found attached to smooth shells the ribs are smooth, but if fixed to *Trigonia pectinata* they are crossed by tubercles.

MYOCHAMA TRANSVERSA, A. Adams. *M. testâ inæquilaterali transversâ fuscâ, subquadratâ, anticè longiore posticè breviorè subtruncatâ, radiatim costatâ, costis subnodosis interdum dichotomis, concentricè minutissimè striatâ, valvâ liberâ subconvexâ, umbone extra apicem valvæ alterius producto.*

(Mollusca, Pl. VIII. fig. 1.)

Shell inequivalve, transverse, light brown, subquadrate, anteriorly longer, posteriorly shorter and rather truncated, radiately ribbed, ribs rather nodulous, sometimes divided in two, very minutely concentrically striated, the free valve rather convex, with the umbo produced beyond the apex of the other valve.

Hab. Cape Upstart, 8 fathoms; *Mr. Jukes.* (Mus. Cuming.)

MYOCHAMA STRANGEI, A. Adams. *M. testâ luted, tenui, fragili, corrugatâ, costis nodosis, non distinctis, concentricè striatâ, lineis radiantibus asperis ad marginem ventralem distinctioribus; valvâ liberâ depressâ umbone plano cinerascen-te non extra apicem valvæ alterius producto.*

Hab. in Australasiâ. (Mollusca, Pl. VIII. fig. 2.)

Shell yellow, thin, fragile, corrugated, ribs nodulous, not distinct, concentrically striated, with rough radiating lines more distinct towards the ventral margin; the free valve depressed, ash-coloured, flattened, not projecting beyond the apex of the other valve.

Hab. Port Jackson; *Mr. Strange.* (Mus. Cuming.)

4. DESCRIPTION OF NEW SPECIES OF THE GENUS CUMINGIA,
WITH SOME ADDITIONAL GENERIC CHARACTERS.

BY ARTHUR ADAMS, R.N., F.L.S. ETC.

(Mollusca, Pl. VIII.)

CUMINGIA, G. B. Sowerby.

Testa bivalvis, inæquilateralis, æquivalvis, latere antico rotundato, postico hiantè subacuminato; dentibus, cardinali, in utràque valvâ unico, parvo antico, lateralibus in alterâ valvâ ad utrumque latus uno, valido, in alterâ nullo; ligamento interno forceolæ subcochleariformi affixio; impressionibus muscularibus duabus lateralibus distantibus, anticè irregulari oblongâ, posticè subrotundatâ; impressione musculari pallii sinu maximo.

Shell ovate, inequilateral, equivalve; a shallow spoon-shaped cardinal tooth and a single small tooth by its side in each valve, a strong lateral tooth on both sides in one valve only; palléal impression with a large sinus, posteriorly gaping.

All the species of this genus gape more or less posteriorly, are more or less lamellose, and the cavity for the cartilage is spoon-shaped and projects into the cavity of the valves, differing in this respect from *Amphidesma* or *Semele*.

CUMINGIA SIMILIS, A. Adams. *C. testâ subtrigonalì-ovatâ decussatè striatâ, lineis transversis concentricis, lamellâ unicâ prope marginem ventralem anticè latiore rotundato supra angulato posticè angustiore subrotatâ, areâ posticè clausâ, lunulâ lanceolato-ovatâ, margine ventrali posticè coarctatâ.*

Hab. in Borea-Occidentali Ora Americæ. (Mollusca, Pl. VIII. fig. 4.)

Shell triangularly ovate, decussately striated, lines of growth transverse and concentric, rather strongly marked, a single lamella near the ventral margin, anterior side the widest, rounded in front and angulated above, posterior side narrower, somewhat beaked posteriorly, area closed, lunule lanceolately oval, ventral margin posteriorly contracted.

Hab. N.W. coast of America. (Mus. Cuming.)

CUMINGIA CLERII, A. Adams. *C. testâ ovatâ compressâ subæquilaterali, albâ, opacâ, sublævi, nitidâ, striis transversis concentricis alveolisque irregularibus, latere antico angustiore rotundato, postico latiore, margine ventrali integro arcuato.*

Hab. ad Talcahuano, Chili. (Mollusca, Pl. VIII. fig. 3.)

Shell ovate, compressed, subequilateral, white, opaque, rather smooth and shining, marked with faint transverse concentric striæ, and numerous pits irregularly disposed, anterior side narrower and rounded, posterior side wider; ventral margin entire, arcuated.

Hab. Found at Talcahuano, Chili, by Capt. Clery, French Marine, attached to fuci in shallow water. (Mus. Cum.)

CUMINGIA ANTILLARUM, A. Adams. *C. testâ ovato-trigonalì, concentricè lamellosâ; lamellis subdistantibus, interstitiis valdè*

longitudinaliter striatis, latere antico brevior latiore rotundato, postico longiore, angustiore subrostrato, valde hiant, margine ventrali postice subsinuato.

Hab. In Indiâ Occidentali.

Shell ovately triangular, concentrically lamellose, lamellæ rather wide apart, the interstices with distinct longitudinal striæ, anterior side shorter, wider, and rounded, posterior side longer, narrower and somewhat beaked, widely gaping, ventral margin posteriorly rather sinuated.

Hab. West Indies. (Mus. Cuming.)

CUMINGIA FRAGILIS, A. Adams. *C. testâ transversâ ovali albâ fragili subpellucidâ concentricè lamellosâ; lamellis elevatiusculis, subdistantibus, interstitiis tenuissimè longitudinaliter striatis, latere antico latiore margine sinuato, postico angustiore rotundato subflexuoso, margine ventrali integro arcuato.*

Hab. in Guadaloupiâ. (Mollusca, Pl. VIII. fig. 7.)

Shell transverse, oval, white, fragile, semipellucid, concentrically lamellose, lamellæ rather elevated and wide apart, interstices very finely longitudinally striated, anterior side wider, the margin sinuated, posterior side narrower, rounded, subflexuous, ventral margin entire and arcuated.

Hab. Guadeloupe; Governor Admiral Tourbeyre. (Mus. Cuming.)

CUMINGIA STRIATA, A. Adams. *C. testâ ovato-trigonalî subventricosâ albâ tenui fragili; striis transversis concentricis elevatis confertis, interstitiis longitudinaliter striatis, latere antico latiore rotundato, postico subacuminato, margine ventrali posticè coarctato.*

(Mollusca, Pl. VIII. fig. 5.)

Shell ovately trigonal, somewhat ventricose, white, thin, fragile, with transverse concentric crowded elevated striæ, the interstices longitudinally very finely striated, anterior side wider and rounded, posterior side rather acuminate, ventral margin posteriorly contracted.

Hab. Conception; seven fathoms, sandy mud; *H. C.* (Mus. Cuming.)

CUMINGIA SINUOSA, A. Adams. *C. testâ subtrigonalî albâ semipellucidâ subæquilaterali concentricè lamellosâ, interstitiis longitudinaliter substriatis, latere antico sublatiore rotundato, postico angustiore, margine ventrali posticè valdè sinuato.*

Hab. in Indiâ Occidentali. (Mollusca, Pl. VIII. fig. 6.)

Shell subtrigonal, white, semipellucid, subequilateral, concentrically lamellose, interstices longitudinally substriated, anterior side rather wider and rounded, posterior side narrower, ventral margin posteriorly deeply sinuated.

Hab. West Indies. (Mus. Cuming.)

February 12, 1850.

William Yarrell, Esq., Vice-President, in the Chair.

The following papers were read :—

1. ON THE TRICHOGLOSSINE GENUS OF PARROTS, EOS, WITH THE DESCRIPTION OF TWO NEW SPECIES. BY CHARLES LUCIAN, PRINCE BONAPARTE, MEMBER OF THE PRINCIPAL ACADEMIES OF EUROPE AND AMERICA.

The genus *Eos* is, like *Eclectus*, a new instance of the impropriety of that *middling course* (as disgusting in science as it is in politics), of uniting together by two and two, four and four, &c., small groups (or *States*), which, natural by themselves, have no stronger relation to each other than to any other member of their family. Take for example (comparing them to Naples and Sicily!) *Spiza* and *Paroaria*, Bon., united by G. R. Gray under his *Spiza*! amongst the *Fringillidæ*, and amongst the Parrots *Psittacodis** and *Eclectus* confounded together by the same process!

The genus *Eos* is intermediate between the two subfamilies *Trichoglossinæ* and *Lorinæ*. Although it may astonish some naturalists that I do not consider it as one of the latter, still, on account of its tail, its anatomy and its habits, I keep it within the boundaries of the former, in close relation with my new genus *Chalcopsitta* †,

* Since I speak of *Psittacodis* (the only *green* Genus of Lorine Parrots, which forms the same beautiful passage from *Lorinæ* to *Psittacinæ* that *Eos* does from *Trichoglossinæ* to *Lorinæ*), let me submit to the Society the phrases of two new species that make the whole number hitherto known five: they come as near *Psittacodis magnus* or *sinensis* (with which I for that reason compare them) as the three *Eclecti* do to each other:—

1. PSITTACUS MAGNUS et SINENSIS, Gm. (*viridis*, Lath.; *lateralis*, Shaw; *Mascarinus prasinus*, Less.; *Psittacodis magnus*, Wagl.; *Eclectus*? *polychlorus*? Gr. ex Scopoli) Pl. Enl. 514; Edw. B. t. 231; Lev. Perr. t. 132.
Major: *iliis rubris*: *marginæ alarum cyaneo*: *cauda apice subconcolori*.
2. PSITTACODIS INTERMEDIUS, Bp. Mus. Lugd.
Minor: *iliis rubris*: *marginæ alarum rubro*: *cauda apice subconcolori*.
3. PSITTACODIS WESTERMANNI, Bp. Zool. Soc. Amst.
Minor: *iliis concoloribus*: *marginæ alarum cæruleo*: *cauda apice subconcolori*.

Dedicated to the able and modest Director of the Zoological Society of Amsterdam, where this new Parrot is living.

† This new genus of mine, though composed of decided *Trichoglossine* Parrots, shows a strong affinity, not only to the *Lorine* but also to the *Platyercine*. It is composed in fact of

1. PLATYCERCUS ATER, Gr. (*Psittacus novæ guineæ*, Gm.; *Ch. novæ guineæ*, Bp.); and of
2. EOS SCINTILLATA, Gr. (*Psittacus scintillatus*, Temm.; *Ch. scintillans*, Bp.); to which I have added a third new species, also from the Moluccas:—

3. CHALCOPSITTA RUBIGINOSA, Bp. Mus. Lugd. ex Ins. Barabay et Guebe.
(Aves, Pl. XVI.)

E. purpureo-badia, *capite obscuriore*; *subtus fasciolata*, *plumis singulis lunula medianâ et apicali nigricante*: *remigibus rectricibusque virescentibus caudâ apicem versus gradatim lutescente*.

Rostrum rubrum: *pedes nigri*: *irides albæ*. *Magnitud. Turdi*.



1851-52

Printed by Bullmandel & Walton,

HALLOPSITTA RUBIGINOSA Bonap



W. J. A. S.



Printed by H. J. W. & W. J. W.

THE LORIKEET GENUS

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which connects it with *Trichoglossus*, the type and centre of the sub-family; as on the other side *Lathamus* and *Charmosina* connect the same *Trichoglossus* through *Coriphilus* (and especially by means of *Lathamus*) with the subfamily *Platycercine*.

It may be characterized by its elegant form, small stature, compact, red plumage with more or less blue; compressed, moderate, red bill, with the cere apparent (not concealed as in *Eclectus*); short feet, with robust toes and powerful, arched, very acute nails; and longish, not very broad, wedged tail.

It is composed, to my knowledge, of only seven species;—five already described (and some of them too many times) in the systems, and two new ones, which form the subject of the present paper, and of which I subjoin the faithful portraits drawn by an anonymous hand, which has no merit in keeping the transparent veil upon an additional claim to our admiration and gratitude, since it is so far beneath its others! And when I say that only five are the hitherto known species of *Eos*, it is because I do not count *Eos variegata* and *Eos Isidorii* of Wagler, since, the first is evidently nothing but a *variegated* or *pieb* bird, and the other, named, described and figured by Swainson, appears identical with *Eos riciniata*, for which the false name of *cochinchinensis* cannot be retained. Of the other three (out of the ten admitted by our friend G. R. Gray, in his 'Genera of Birds'), *E. scintillata* is a *Chalcopsitta*, and *E. cervicalis* and *ornata* are *Trichoglossi*!

1. *EOS CYANOGENIA*, Bp. (Aves, Pl. XIV.)

E. rubra; maculâ magnâ periophthalmicâ cyanâ: humeris ex toto, remigibus elongatis rectricibusque magnâ ex parte nigris.

Long. 9 poll.; alæ, 6½ poll.; caudæ, 4 poll.

Close to *Eos indica* or *coccinea*, but having no blue on the head, back or breast; and instead, a large blue patch, including the eye and covering the cheek, which *Eos indica* has red; the black also is more predominant on the wings, and the red tinge duller. The phrase in English may be:

"Brownish red; the whole of the shoulder and great part of the wing- and tail-feathers black; a large azure patch on each side of the head."

I found the specimen upon which I did not hesitate to establish my species among the endless treasures of the Leyden Museum.

2. *EOS SEMILARVATA*, Bp. (Aves, Pl. XV.)

E. coccinea; vittâ a guld ultrâ oculos, maculâ utrinque scapulari, crissoque, cyaneis: remigibus brevibus rectricibusque apice tantum nigris.

Long. 9 poll.; alæ, 5¾ poll.; cauda, 4 poll.

Resembling *Eos rubra*, but much smaller and *half-masked*!

"Entirely red, even on the shoulders; the tips only of the quills and tail-feathers black; two symmetrical spots on the scapularies, under tail-coverts and *semi-mask* extending from the throat behind the eyes, rich blue."

I picked up this beautiful species in the rising Museum annexed to the Zoological Gardens of Amsterdam ; and as soon as he became aware of the value of his bird, Mr. Westermann, as a compliment to Dr. Schlegel and myself, with a liberality of which few men even of science are capable, made a present of it to the Leyden Museum ; where, duly greeted by Mr. Temminck, the typical specimen is safely deposited.

To complete the monography of the genus, I add the comparative phrases of the five other species, all of which have several beautiful representatives in the Leyden Museum.

1. EOS INDICA, Wagl.

E. coccinea ; fasciâ verticis latissimâ, cervice, dorso, pectore, tibisque, cyaneis : tectricibus alarum internis et remigibus apice nigris.

Synonyms.

Psittacus indicus, Gm.

Psittacus variegatus, Gm., *Lath. ex Buff. Pl. Enl.* 143.

Psittacus coccineus, Lath.

Eos indica, Gr.

Eos variegata, Gr.

Perruche des Indes orientales, *Buff. Pl. Enl.* 143, accidental var. !

Le Lori-Perruche violet et rouge, *Levaill. Perr.* t. 53.

Hab. In Insulis Moluccis.

2. EOS RUBRA, Wagl.

E. rubra ; crisso, scapularibusque cyaneis ; tectricum majorum margine apicali, remigibusque primariis externè nigris.

Synonyms.

Psittacus ruber, Gm.

Psittacus borneus ? Gm., *Lath. jun.*

Psittacus cœruleatus, Shaw.

Psittacus cyanonotus, Vieill.

Eos rubra, Gr.

Lory de la Chine, *Buff. Pl. Enl.* 519.

Le Perroquet Lori à franges bleues, *Levaill. Perr.* t. 93.

La Perruche écarlate, *Lev. Perr.* t. 44.

Hab. In Insulis Moluccis ; Amboina.

3. EOS GUEBIENSIS, Wagl.

E. coccinea, sapius tamquam squamata ; plumis pilei, colli, pectoris et laterum margine nigro-virescentibus : alarum fasciâ duplici remigibusque apice nigris.

Synonyms.

Psittacus guebiensis, Auct.

Psittacus squameus, Shaw.

Eos squamata, Gr. ex Scopoli.

Lory de Gueby, *Buff. Pl. Enl.* 684.

Le Lori écaillé, *Levaill. Perr.* t. 51.

Hab. In Insulis Gueby, Buron et Ceram.

4. *Eos RICINIATA*, Bp.

E. rubra; vertex, collo et maculâ abdominali magnâ, cyaneis : tectricibus alarum remigibusque ad apicem latè nigris.

Synonyms.

Psittacus cochinchinensis, Lath.

Psittacus riciniatus, Bechst.

Psittacus cucullatus, Shaw.

Lorius Isidorii, Sw. Zool. Ill. n. s. t.

Lorius riciniatus, Müll.

Eos cochinchinensis, Wagl., Gr.

Perruche à chaperon bleu, Levaill. Perr. t. 54.

Hab. In Insulis Moluccis. Gilolo et Ternate, Forsten, Müller ; nec in Cochinchina!

5. *Eos CYANOSTRIATA*, Gr.

E. rubra, alis caudâque, nigro variis; maculâ postoculari nigro-cæruleâ: dorso striis cæruleis.

Synonyms.

Lorius borneus! Less. Traité d'Orn. p. 192, nec Lath.

Eos cyanostriata, Gray and Mitchell, Gen. of Birds, t. 103.

Hab. In Insulis Moluccis, minimè in Borneo!

2. AN ARRANGEMENT OF STOMATELLIDÆ, INCLUDING THE CHARACTERS OF A NEW GENUS, AND OF SEVERAL NEW SPECIES.
BY ARTHUR ADAMS, R.N., F.L.S. ETC.

STOMATELLIDÆ.

Head broad, probosciform; tentacles subulate, with a fimbriated lobe at their inner bases; eyes on peduncles at their outer bases; mantle with the front edge entire; muscle of attachment crescentic, open in front; foot with a lateral membrane. Operculum rudimentary or none. Shell imperforate, with a crescentic muscular impression, open in front.

The family *Stomatellidæ* differs from that of *Haliotidæ* in the mantle not being fissured anteriorly, in the muscle of attachment being in the form of a horseshoe round the sides and posterior part of the mantle, instead of being oval and central, and in the shell not being perforated. In their habits they are littoral, living on coral reefs and attached to stones near the shore. Some of the genera, as *Gena*, *Stomatella* and *Stomatia*, have considerable locomotive powers, and glide, especially *Gena*, with some degree of celerity. The latter genus and *Stomatia* possess the faculty, common to some other kinds of mollusca, of spontaneously detaching a considerable portion of the hind part of the foot when disturbed or irritated.

STOMATELLA, Lamarck.

Animal spiral, retractile within the shell; tentacular lobes triangular, with the front edge fringed; foot small, not tubercular, not

produced posteriorly, operculigerous, lateral membrane very wide, the circumference regularly fimbriated. Operculum orbicular, thin, horny, multispiral. Shell spiral, suborbicular, depressed, transversely ribbed or sulciferous; spire more or less elevated, whorls rounded; aperture large, wider than long, pearly within.

STOMATELLA IMBRICATA, Lamarck.

Hab. Torres Straits; Jukes. (Mus. Cuming.)

Stomatella imbricata, Lamk. *Ency. Méth.* p. 450. f. 2; *Hist. Nat. An. s. Vert.* vol. vi. p. 209.

STOMATELLA CANCELLATA, Krauss.

Hab. Table Bay, Cape of Good Hope. (Mus. Cuming.)

Stomatella cancellata, Krauss, *Sudafrican Moll.* tab. 5. fig. 26.

STOMATELLA COSTELLATA, Adams. *S. testâ suborbiculatâ, convexo-depressâ, albidâ, imperforatâ, costellis transversis obtusis strisque elevatis longitudinalibus decussatâ; spirâ subprominulâ; aperturâ magnâ, obliquâ, oblongâ.*

Hab. —?

Shell suborbicular, convexly depressed, whitish, imperforate, with obtuse transverse ribs and decussating longitudinal elevated striæ; spire rather prominent; aperture large, oblique, oblong.

Hab. —? (Mus. Metcalf.)

STOMATELLA ARTICULATA, Adams. *S. testâ suborbiculari, imperforatâ, convexâ, tenui, griseâ, costulis transversis nigro-articulatis, interstitiis lineis longitudinalibus elevatis ornatâ; spirâ prominulâ, anfractibus rotundatis; aperturâ oblongo-ovali, longiore quam latiore.*

Hab. In insulis Pacificis.

Shell suborbicular, imperforate, convex, thin, grey, ornamented with transverse ribs articulated with black, the interstices with longitudinal elevated lines; spire rather prominent, whorls rounded; aperture oblong-oval.

Hab. Australia; Lord Hood's Island, South Seas, on the pearl oyster; *H. C.* (Mus. Cuming.)

STOMATELLA SULCIFERA, Lamarck.

Hab. Philippines, Catbalonga; island of Samar, under stones; isle of Ticao, on the reefs, low water; *H. C.* (Mus. Cuming.)

Stomatella sulcifera, Lamk. *Hist. Nat. An. s. Vert.* p. 210.

STOMATELLA MACULATA, Quoy and Gaimard.

Hab. Catanuan, province of Tayabas, island of Luzon, under stones, low water; *H. C.* (Mus. Cuming.)

STOMATELLA MONILIFERA, Adams. *S. testâ suborbiculari, convexo-depressâ, imperforatâ, albidâ, rufo-punctatâ, costellis moniliferis confertis transversis ornatâ; aperturâ obliquâ, subcirculari.*

Hab. —?

Shell suborbicular, convexly depressed, imperforate, whitish, with rufous spots, ornamented with small, close-set, beaded, transverse ribs; aperture oblique, subcircular.

Hab. — ? (Mus. Metcalf.)

STOMATELLA DECOLORATA, Gould.

Hab. Mangsi Island; Gould.

Species unknown to me. "Allied to *S. maculata*, Quoy, but the spire is less elevated, aperture more round, and a plain white lunate area adjacent to the columella."

Stomatella decolorata, Gould, *Expedition, Shells*, p. 51.

STOMATELLA PAPYRACEA, Chemnitz.

Hab. China Sea and Sooloo Archipelago. (Mus. Cuming.)

Turbo papyraceus, Chemnitz. *Stomatella tumida*, Gould, *Expedition, Shells*, p. 51.

STOMATELLA MALUKANA, Adams. *S. testâ suborbiculatâ, convexâ, imperforatâ, transversim sulcatâ, longitudinaliter striatâ, costulis transversis striatis cinctâ, mustelinâ rufo-fusco variegatâ, subtus costis albo rufoque articulatis; spirâ prominulâ; aperturâ ovali, longiore quam latiore.*

Hab. in insulis Moluccis.

Shell suborbicular, convex, imperforate, transversely sulcated, longitudinally striated, encircled with transversely striated ribs, yellowish brown variegated with red brown, inferiorly the ribs articulated with white and fuscous; spire rather prominent; aperture oval, longer than wide.

Hab. Molluccas.

STOMATELLA ORBICULATA, Adams. *S. testâ suborbiculari, convexâ, virescenti, castaneo variegatâ, transversim sulcatâ, longitudinaliter striatâ, costis confertis rotundatis; spirâ prominulâ, anfractibus rotundatis; aperturâ subcirculari, intus viridescenti.*

Hab. in freto Mosambico.

Shell suborbicular, convex, greenish, variegated with chestnut, transversely sulcated, longitudinally striated, with numerous round, close-set, transverse ribs; spire prominent, whorls rounded; aperture nearly circular, pearly and green internally.

Hab. Mosambique, under stones, low water; *Rev. W. V. Henner.* (Mus. Cuming.)

STOMATELLA JAPONICA, Adams. *S. testâ suborbiculari, imperforatâ, convexâ, fuscâ, transversim costulatâ, costulis confertis nodulosis, interstitiis tenuissimè longitudinaliter striatis; spirâ prominulâ, anfractibus costatis rotundatis; aperturâ subcirculari, intus margaritaced.*

Hab. in insulis Japonicis.

Shell suborbicular, imperforate, convex, fuscous, transversely ribbed; ribs small, nodulous, close together; interstices with smaller

ribs, and very finely longitudinally striated; spire somewhat prominent; whorls ribbed and rounded; aperture subcircular, pearly and green within.

Hab. Japan. (Mus. Cuming.)

STOMATELLA HALIOTIDEA, Sowerby.

Hab. Philippines, Oalaguete; Loon, isle of Bohol, under stones, low water; San Estevan, prov. South Ilocos; *H. C.* (Mus. Cuming.)
Stomatella haliotidea, *Sowerby, Genera.*

STOMATELLA FULGURANS, Adams. *S. testâ suborbiculari, subperforatâ, convexâ; spirâ acuminatâ, apice acuto rosed, transversim sulcatâ, carinulis transversis albo maculatis, longitudinaliter striatis, striis subtilis obsoletis, albidâ lineis fuscis undulatis variegatâ; aperturâ ovali, obliquâ, intus margaritaceâ, valdè sulcosâ.*

Hab. in insulis Philippinis.

Shell suborbicular, subperforate, convex; spire acuminate, apex acute, rosy, transversely sulcated, with small transverse keels marked with white, longitudinally striated, striae obsolete inferiorly, whitish variegated with brown undulating lines; aperture oval, oblique, pearly within and strongly sulcated.

Hab. Bais, island of Negros, under stones, low water; *H. C.* (Mus. Cuming.)

STOMATELLA SANGUINEA, Adams. *S. testâ orbiculatâ, depressâ; spirâ prominulâ, acutâ, coccineâ, transversim tenuissimè sulcatâ, longitudinaliter obliquè striatâ, carinulis transversis subdistantibus nodulosis; aperturâ ovali, obliquâ; columellâ subcallosâ, areâ umbilicali albâ, intus margaritaceâ sulcosâ.*

Hab. in insulis Philippinis.

Shell orbicular, depressed; spire rather prominent, acute, blood-red, transversely very finely sulcated, longitudinally obliquely striated, with nodulous, transverse, rather distant carinae; aperture oval, oblique; columella somewhat callous, with a white umbilical area, pearly and sulcated internally.

Hab. Island of Ticao, under stones, low water; *H. C.* (Mus. Cuming.)

STOMATELLA SPECIOSA, Adams. *S. testâ orbiculato-conicâ, albâ sanguineo maculatâ, transversim carinatâ, longitudinaliter valdè striatâ, carinis obtusis prominentibus carinulis intermediis; spirâ prominulâ, anfractibus tricarinatis; aperturâ ovali, intus margaritaceâ.*

Hab. ad insulam Grimwoodianam.

Shell orbiculate conical, white marked with crimson blotches, transversely carinated, longitudinally strongly striated, keels obtuse, rather prominent, with small intermediate keels; spire rather prominent, whorls tricarinated; aperture oval, pearly within.

Hab. Grimwood's Island; *H. C.* (Mus. Cuming.)

STOMATELLA COCCINEA, Adams. *S. testâ orbiculato-conicâ, subperforatâ, coccineâ, maculis albis seriatim dispositis in anfractu ultimo ornatâ, transversim tenuiter sulcatâ, anfractu ultimo subangulato; spirâ prominente, anfractibus bicarinatis; aperturâ subcirculari, labio posticè reflexo, calloso.*

Hab. in insulis Occidentalibus.

Shell orbiculately conic, subperforate, scarlet, adorned with white spots arranged in a row on the last whorl, transversely very finely sulcated, last whorl somewhat angulated; spire prominent, whorls bicarinated; aperture subcircular, inner lip posteriorly reflexed and callous.

Hab. St. John's; Mr. Hartweg.

STOMATELLA TIGRINA, Adams. *S. testâ orbiculato-conicâ, perforatâ, albidâ, fasciis rufis radiatim dispositis ornatâ, bicarinatâ, carinis elevatiusculis, obtusis, transversim striatâ, striis regularibus; spirâ prominente, anfractibus angulatis; aperturâ subcirculari, labio subreflexo, calloso; umbilico distincto, subobecto.*

Hab. — ?

Shell orbiculately conical, umbilicated, whitish adorned with red bands radiately disposed, bicarinated, keels rather elevated, obtuse, transversely striated, striæ regular; spire prominent, whorls angulated; aperture subcircular, inner lip somewhat reflexed and callous; umbilicus distinct, partly covered.

Hab. — ?

STOMATELLA MARGARITANA, Adams. *S. testâ turbinatâ, spirâ elevatâ, anfractibus rotundatis, rubrâ longitudinaliter substriatâ, transversim costulatâ, costulis subnodulosis inaequalibus; aperturâ suborbiculari, intus margaritaceâ, labro semicirculari; umbilico callo, obecto.*

Hab. in littoribus Australiæ. (Mus. Cuming.)

A small, red, transversely ribbed species, having very much the appearance of a *Margarita*.

STOMATELLA BIPORCATA, Adams. *S. testâ turbinatâ, subdepressâ, rubrâ, albo obscure variegatâ, transversim sulcatâ; spirâ acuminatâ, anfractibus quatuor, anfractu ultimo porcis duabus prominentibus instructâ; aperturâ subquadratâ, intus margaritaceâ, labio subrecto, labro in medio biangulato, umbilico callo, obecto.*

Hab. in littoribus Australiæ. (Mus. Cuming.)

A small red species with two rounded ridges on the last whorl and a subquadrate aperture.

STOMATIA, Helbling.

Animal spiral, too large to entirely enter the shell, tentacular lobes digitated. Foot large, tubercular, greatly produced behind; lateral membrane fringed, ending anteriorly on the left side in a fimbriated

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crest under the eye-peduncle, and on the right in a slightly projecting fold or gutter leading to the respiratory cavity. Operculum none. Shell subspiral, oblong, or suborbicular, carinated or tuberculated; spire prominent; aperture wider than long, pearlaceous within.

STOMATIA PHYMOTIS, Lamarck.

Hab. Philippine Islands, Matnag, province of Albay, Luzon, on the reefs; *H. C.* (Mus. Cuming.)

STOMATIA AUSTRALIS, Adams. *S. testâ haliotidâ, ovato-oblongâ, sublatâ, olivaceâ, dorso lævigatâ, transversim tenuè striatâ, carinis duabus rotundatis, inferiori tuberculatâ; aperturâ anticè dilatatâ, labro supra ultimum anfractum ascendente.*

Hab. in littoribus Australiæ.

Shell rather broad, olivaceous, back nearly plain, transversely finely striated, with two rounded keels, the lower one tuberculated; aperture dilated anteriorly, outer lip ascending on the body whorl.

Hab. Darnley's Island, Torres Straits, under stones; *Jukes.* (Mus. Cuming.)

STOMATIA DUPLICATA, Sowerby.

(P. Z. S. Mollusca, Pl. VIII. fig. 13, 14, 15.)

Hab. Cagayan, province of Misamis, island of Mindanao, under stones, low water; *H. C.* (Mus. Cuming.)

STOMATIA ANGULATA, Adams. *S. testâ orbiculato-convexâ, subdepressâ, viridulâ, transversim valdè costulatâ, interstitiis longitudinaliter striatis, carinis duabus elevatis simplicibus angulatis; aperturâ transversâ, subcirculari, labro in medio biangulato.*

Hab. in insulis Philippinis.

Shell orbicular, rather depressed, olive-green, transversely coarsely costulated, interstices longitudinally striated, with two elevated, simple, angulated ridges; aperture transverse, suborbicular, outer lip biangulated in the middle.

Hab. San Estevan, province of South Ilocos, island of Luzon and island of Ticao, under stones, low water; *H. C.* (Mus. Cuming.)

STOMATIA DECUSSATA, Adams. *S. testâ ovato-oblongâ, longitudinaliter et transversim decussatè striatâ, carinis duabus simplicibus aut subtuberculatis angulatis prominentibus, pallidâ maculis fuscis variegatâ; spirâ elevatâ; aperturâ obliquâ, fere orbiculari, labro biangulato in medio.*

Hab. in insulis Philippinis.

Shell decussately transversely and longitudinally striated with two acute simple or subtuberculated prominent keels, pale marked with light brown blotches and fine puncta; spire elevated; aperture oblique, nearly orbicular, outer lip biangulated in the middle.

Hab. Sorsogon, province of Albay, island of Luzon, on smooth stones, 6 fathoms; *H. C.* (Mus. Cuming.)

STOMATIA ACUMINATA, Adams. *S. testâ haliotideâ, suborbiculatâ, subfuscâ, cancellatâ, transversim costatâ, costis tribus prominentibus, mediâ valdè prominulâ tuberculatâ, valdè plicatâ prope suturam, longitudinaliter elevatè striatâ; spirâ prominulâ, acuminatâ, anfractibus quatuor angulatis, labro in medio triangulato.*

Hab. in insulis Philippinis.

Shell reddish brown, cancellated, transversely ribbed, three ribs very prominent, the middle one more so than the others and strongly tuberculated, strongly plicated near the suture, longitudinally elevately striated; spire prominent, acuminate, whorls four, angled; aperture suborbicular, obliquely transverse, outer lip triangulated in the middle.

Hab. Philippine Islands. (Mus. Cuming.)

STOMATIA LIRATA, Adams. *S. testâ orbiculato-convexâ, liris transversis subæqualibus elevatis vix nodulosis, interstitiis valdè longitudinaliter striatis, prope suturam subplicatâ, pallidâ, fusco radiatim marmoratâ; spirâ subprominulâ, anfractibus rotundatis; aperturâ obliquâ, oblongo-ovali, labro convexo, rotundato.*

Hab. —?

Shell orbicular, convex, with nearly equal transverse raised ridges, ridges slightly nodulous, interstices strongly longitudinally striated, plicated near the spire, pallid, radiately marbled with brown; spire rather elevated, whorls rounded; aperture oblique, oblong-oval, outer lip convex, rounded.

Hab. —? (Mus. Cuming.)

STOMATIA RUBRA, Lamarck.

Hab. Philippine and Corean Archipelago. (Mus. Cuming.)

STOMATIA NOTATA, Adams. *S. testâ suborbiculari, depressâ, pallide roseâ, maculis purpureis valdè distinctis ornatâ, transversim carinatâ, carinis acutis prominentibus subdistantioribus, longitudinaliter valdè obliquè striatâ; spirâ subprominulâ, anfractibus carinatis, apice acuto; aperturâ subcirculari, intus margaritaceâ et transversim sulcatâ.*

Hab. —? (Mollusca, Pl. VIII. fig. 16.)

Shell suborbicular, depressed, pale rose-colour, adorned with very defined dark purple spots, transversely keeled; keels acute, rather prominent, somewhat wide apart, longitudinally strongly obliquely striated; spire rather prominent, whorls carinated, apex acute; aperture subcircular, transversely sulcated and pearly within.

Hab. —? (Mus. Cuming.)

STOMATIA CANDIDA, Adams. *S. testâ suborbiculatâ, depressâ, candidâ, transversim totâ carinatâ, carinulis parvis confertis permultis elevatiusculis subnodulosis, interstitiis longitudinaliter tenuissimè striatâ; spirâ depressiusculâ, anfractibus rotundatis; aperturâ obliquâ, subcirculari, longiore quam latiore.*

Hab. in insulis Koreanicis.

Shell orbicular, depressed, white, transversely entirely carinated; keels very small, close together and very numerous, subnodulous and slightly elevated; interstices longitudinally very finely striated; spire somewhat depressed, whorls rounded; aperture oblique, sub-circular, longer than wide.

Hab. Korean Archipelago, coral reefs; *A. H.* (Mus. Cuming.)

STOMATIA PALLIDA, Adams. *S. testá suborbiculari; spirá acuminatá, albá, radiis pallidis longitudinalibus pictá, transversim lirátá, interstitiis decussatè striatis; aperturá transversá, sub-ovali, intus porcellaná, labio subrecto, calloso.*

Hab. ad Insulam Lord Hood, dedicav. (Mus. Cuming.)

A species somewhat resembling in colouring the striped variety of *S. notata*, but which differs materially in form and sculpture.

MICROTIS, new genus.

Animal as in *Stomatia*, but the foot with a deep anterior fissure for the head, and the front edge bilobed. Operculum none. Shell spiral, suborbicular, depressed, with two tuberculated ridges; spire slightly prominent; aperture very large, wider than long, pearly within, columellar margin spiral, visible as far as the apex of the spire.

MICROTIS TUBERCLATA, Adams. *M. testá suborbiculari, halio-tidè, valdè depressá, viride variegatá, transversim striatá, bicarinatá, carinis tuberculatis, prope suturam nodulosim plicatá; spirá vix elevatá, anfractibus carinatis; aperturá magná, ovali, intus bisulcatá margaritaced.*

Hab. in insulis Philippinis. (Mollusca, Pl. VIII. fig. 8-12.)

Shell suborbicular, ear-shaped, greatly depressed, variegated with green, transversely striated, bicarinated; keels tuberculated, nodosely plicated near the suture; spire scarcely elevated, whorls carinated; aperture large, oval, pearly within, with two concentric parallel grooves.

Hab. Island of Capul, on the sands, high water; *H. C.* (Mus. Cuming.)

GENA, Gray.

Animal subspiral, oval, depressed, too large to enter the shell; tentacular lobes plumose. Foot very large, tubercular, posteriorly produced; lateral membrane not fimbriated, more or less extended, and covering the shell. Operculum none. Shell subspiral, oblong, ear-shaped, depressed, smooth or striated; spire flattened, nearly obsolete; aperture large, pearly within.

GENA PLANULATA, Lamarck.

Hab. Isle of Camaguin, under smooth stones, low water; Gindulman, isle of Bohol, under stones; *H. C.* (Mus. Cuming.)

Stomatella planulata, Lamarck, *Hist. An. s. Vert.* vol. vi. p. 210; *Encyclop. Méth.* pl. 40. f. 4 a, b.

GENA AURICULA, Lamarck.

Hab. Eastern Seas ; Red Sea ; Celebes. (Mus. Cuming.)

Stomatella auricula, Lamk. *Hist. An. s. Verq.* vi. p. 210. *Patella lutea*, Linn.

GENA NIGRA, Quoy and Gaimard.

Hab. Eastern Seas. (Mus. Cuming.)

Stomatella nigra, Quoy & Gaimard, *Voy. de l'Astr.* v. 3. pl. 66 bis, fig. 10-12.

GENA PLUMBEA, Adams. *G. testâ haliotided, ovato-oblongâ, dorso latere dextro gibbosâ, sinistro planulatâ, plumbeâ, decussatè totâ striatâ ; spirâ prominulâ, anfractibus rotundatis, anfractu ultimo ad suturam gibboso ; aperturâ posticè subcanaliculatâ, labro in medio flexuoso.*

Hab. Java.

Shell gibbous on the right side, flattened on the left, lead-coloured, decussately striated over the back ; spire rather prominent, the whorls rounded, last whorl gibbous at the suture ; aperture slightly channelled posteriorly, outer lip flexuous in the middle.

Hab. Java. (Mus. Cuming.)

GENA STRIGOSA, Adams. *G. testâ haliotided, ovato-oblongâ, dorso subplanatâ, totâ striatâ, striis irregularibus subconfertis, olivaceâ lilaceo alboque varid, fasciis subfuscis, pallidis alternantibus longitudinaliter ornatâ, labro haud sinuoso.*

Hab. — ?

Shell rather depressed, the back equally convex, striated all over, olivaceous varied with white and lilac, marked with alternate light and dark bands, the light bands sometimes articulated ; spire depressed, outer lip slightly sinuous.

Hab. — ? (Mus. Cuming.)

GENA STRIATULA, Adams. *G. testâ haliotided, ovato-oblongâ, dorso planiusculâ, totâ striatâ, striis profundis subdistantibus, rubrâ, flaveolo aurantiaco fuscoque variè pictâ ; spirâ prominulâ, nunquam subdistortâ ; labro valdè flexuoso.*

Hab. Australia ; et in insulis Philippinis.

Shell very elongated, slightly convex, strongly striated all over the back, red varied with orange, light yellow and brown ; spire elevated, often distorted ; outer lip very flexuous.

Hab. Calapan, island of Mindoro, on small stones, 9 fathoms ; *H. C.* Swan River, *Lieut. Preston* ; Australia. (Mus. Cuming.)

GENA VARIA, Adams. *G. testâ haliotided, ovato-oblongâ, politâ, dorso æqualiter convexâ, latere sinistro striatâ ; luteo, rubro alboque variegatâ ; spirâ prominulâ, erectâ, acuminatâ.*

Hab. Australia ; et in insulis Philippinis.

Shell smooth, polished, back equally rounded, striated on the left side, varied with yellow, red and white ; spire rather elevated, lateral, upright and pointed.

Hab. Calapan, island of Mindoro, on small stones, 9 fathoms ; *H. C.*

Acapulco, on the sands, *Col. Moffat*; Australia. A pretty little species usually confounded with *G. auricula*. (Mus. Cuming.)

GENA CONCINNA, Gould.

Hab. Sandy Island.

GENA MINIMA, Dufo.

Hab. Seychelles, dredged from 6 fathoms; *Dufo*.

Stomatella minima, *Dufo*, *Ann. Sc. Nat.* Oct. 1840, p. 202. Species unknown to me.

GENA IRASATA, Dufo.

Hab. Seychelles.

Stomatella irasata, *Dufo*, *Ann. Sc. Nat.* Oct. 1840. Species unknown to me.

GENA PULCHELLA, Adams. *G. testâ convexo-depressâ, ovali, albâ, rufo maculatâ, dorso convexâ, totâ striatâ; spirâ prominulâ, anfractibus rotundatis; aperturâ magnâ, ovali, intus margaritaceâ, iridescente.*

Hab. —?

Shell convexly depressed, oval, white, with large rufous spots; back convex, striated all over; spire rather prominent, whorls rounded; aperture large, oval, pearly within.

Hab. —? (Mus. Metcalf.)

GENA LINTRICULA, Adams. *G. testâ haliotided, oblongâ, dorso convexâ, totâ tenuissimè striatâ, tenui, fragili, carneolâ, rubro maculatâ; spirâ subterminali, minimâ, ad latus decumbente; aperturâ apertâ, valdè elongatâ.*

Hab. in insulis Philippinis.

Shell elongated, regularly convex, entirely striated, thin, fragile, pink, with darker spotted and articulated lines; spire nearly posterior, slightly elevated; aperture elongated anteriorly, dilated.

Hab. Calapan, island of Mindoro, on smooth stones, 9 fathoms; *H. C.* (Mus. Cuming.)

GENA ASPERULATA, Adams. *G. testâ haliotided, dorso convexâ, rufo-fusâ cingulâ albâ latâ longitudinali ornatâ, lineis elevatis subconfertis, striisque longitudinalibus obliquis decussatâ; spirâ posticâ, subprominulâ, albâ; aperturâ elongatâ, ovali.*

Hab. —?

Shell ear-shaped, back convex, red-brown with a broad white longitudinal band, decussated with transverse raised lines and oblique longitudinal elevated striæ; spire posterior, slightly prominent; aperture elongated, oval.

Hab. —? (Mus. Metcalf.)

GENA NEBULOSA, Adams. *G. testâ haliotided, ovato-oblongâ, dorso totâ striatâ, albâ rufo-fusco nebulosâ; spirâ prominulâ, anfractibus angulatis; aperturâ elongatâ, ovali; columellâ callo crasso rimam umbilicalem obtegente.*

Hab. Australia.

Shell flat, depressed, entirely striated, white clouded with red-brown; spire rather prominent, the whorls angulated; aperture elongated, oval; columella with a thickened callus covering the umbilical fissure.

Hab. Australia. (Mus. Cuming.)

GENA ORNATA, Adams. *G. testá subturbinatá, orali, lævi, politá, dorso convexá, fusco-rubrá, lineis nigris albo-articulatis longitudinalibus; spirá prominulá, roséá; aperturá orali; columellá curratá, simplici; labro reflexo, posticè subflexuoso.*

Hab. in insulis Philippinis. (Mollusca, Pl. VIII. fig. 17.)

Shell oval, smooth, polished, convex, red-brown, with regular distinct black longitudinal lines articulated with white; spire rosy, rather prominent; aperture oval; columella curved, simple; outer lip convex, slightly inflexed posteriorly.

Hab. Island of Ticao, Philippines, on the reefs, low water; *H. C.* (Mus. Cuming.)

GENA LINEATA, Adams. *G. testá subturbinatá, solidá, lævi, politá, convexá, orali, carneolá lineis rubris longitudinalibus ornata; spirá prominulá, anfractibus rotundatis; aperturá subrotundatá; columellá planulatá, callosá, labro simplici.*

Hab. —?

Shell thick, smooth, polished, convex, oval, light pink, with regular parallel continuous red lines arranged longitudinally; spire prominent, whorls rounded; aperture nearly circular; columella flattened, with a callous deposit, outer lip simple.

Hab. —? (Mus. Cuming.)

BRODERIPIA, Gray.

Animal unknown. Operculum? Shell ancyliiform, nonspiral, oblong-ovate, flattened, apex posterior, involute; aperture very large, ovate, pearly internally.

Scutella, *Broderip* (pars).

BRODERIPIA IRIDESCENS, Broderip, sp.

Hab. Pacific Ocean, Grimwood's Island. (Mus. Cuming.)

Scutella iridescens, *Broderip*, *Proc. Zool. Soc.* June 1834.

BRODERIPIA ROSEA, Broderip, sp.

Hab. Pacific Ocean, Grimwood's Island. (Mus. Cuming.)

Scutella rosea, *Broderip*, *Proc. Zool. Soc.* June 1834.

BRODERIPIA CUMINGII, A. Adams. *B. testá ovatá, depresso-convexá, subpellucidá, pallidá, radiis rubris pictá, concentricè corrugato-striatá, striis granulosis, vertice postico excentrico-submarginali; aperturá patulá, intus margaritacéá, margine albo limbo maculis rufis picto; margine columellari acuté angulato prominente, posticè subrecto.*

Hab. in insulis Philippinis (Capul). (Mus. Cuming.)

Distinguished from *B. iridescens* by its prominent angulated columellar margin and granulated-corrugose surface.

SCISSURELLA, D'Orbigny.

Animal unknown. Operculum none. Shell very small or minute heliciform; spire depressed; aperture suborbicular, effuse; outer lip with a narrow fissure or slit; umbilicus open.

? *Anatomus*, Montfort.

SCISSURELLA ANGULATA, Lovèn.

Hab. Scandinavia.

Scissurella angulata, Lovèn, *Index Moll. Scand.* p. 20.

SCISSURELLA PLICATA, Philippi.

Hab. Shores of the Peninsula of Thapsi.

Scissurella plicata, Phil. *En. Moll. Sicil.* vol. i. p. 187, vol. ii. tab. 25. fig. 18.

Scissurella d'Orbignyi, Scacchi.

SCISSURELLA STRIATULA, Philippi.

Hab. Peninsula of Magnisi.

Scissurella striatula, Phil. *En. Moll. Sicil.* vol. ii. p. 160.

SCISSURELLA DECUSSATA, D'Orbigny.

Scissurella decussata, D'Orbigny, *Mém. Soc. d'Hist. Nat. de Par.* i. p. 340.

SCISSURELLA CRISPATA, Fleming.

Scissurella crispata, Fleming, *Brit. An.* p. 361–366.

3. MONOGRAPH OF THE GENUS ANATINELLA.

By ARTHUR ADAMS, R.N., F.L.S. ETC.

ANATINELLA, Sowerby.

Testa ovata æquivalvis, subæquilateralis, latere antico rotundato, postico subrostrato, subtruncato; ligamento interno, processui cochleariformi affixo, dentibus duobus cardinalibus in utraqve valde ante processum positus; impressionibus muscularibus duabus, antica oblonga, irregulari, postica subcirculari; impressione musculari pallii integra; appendice cardinali interna nulla.

Shell ovate equivalve, nearly equilateral, anterior side rounded, posterior slightly beaked and subtruncated. Ligament internal, fixed to a spoonshaped process in each valve, on the anterior side of which are placed two rather elongated cardinal teeth. Muscular impressions two, lateral, distant, the anterior oblong and irregular, the posterior nearly circular. Pallial impression entire, without any sinus. No testaceous appendage within the hinge.

ANATINELLA SIBBALDII, Sowerby. *A. testâ solidiori, subopacâ, lævi, valde concentricè corrugatâ, longitudinaliter obsolete substriatâ; latere postico, acuminato, subtruncato; margine dorsali posticè declivi; processu cochleariformi crasso lato; margine ventrali valde arcuato.*

Hab. —?

Shell rather solid, subopaque, smooth, strongly concentrically wrinkled, longitudinally obsoletely substriated; posterior side acuminate, subtruncated; dorsal margin posteriorly sloping; spoon-shaped process thick and wide; ventral margin strongly arcuated.

Hab. Ceylon, on the sands. (Mus. Cuming.)

ANATINELLA DILATATA, Adams. *A. testâ tenui, fragili, concentricè corrugatâ, longitudinaliter striatâ, latere postico dilatato, obliquè valdè truncato, margine dorsali posticè horizontali recto, processu cochleariformi parvo tenui, dentibus cardinalibus valdè divergentibus; margine ventrali arcuato.*

Hab. — ?

Shell thin, fragile, concentrically wrinkled, longitudinally striated; posterior side dilated, obliquely strongly truncated; dorsal margin posteriorly horizontal and straight; spoonshaped process small, thin; cardinal teeth greatly diverging, ventral margin arcuated.

Hab. Puteao, Philippines, on sand-banks, at low water; *H. C.* (Mus. Cuming.)

ANATINELLA VENTRICOSA, Adams. *A. testâ tenui, ventricosâ, semipellucidâ, concentricè corrugatâ, longitudinaliter conspicuè striatâ, striis elevatusculis, latere postico rotundato; margine dorsali posticè declivi; processu cochleariformi tenui, angusto; margine ventrali leviter arcuato.*

Hab. — ?

Shell thin, ventricose, semipellucid, concentrically wrinkled, longitudinally conspicuously striated, striae rather elevated, posterior side rounded, dorsal margin posteriorly sloping; spoonshaped process thin, narrow, ventral margin slightly arcuated.

Hab. Puteao, Philippines, on sand-banks, at low water; *H. C.* (Mus. Cuming.)

February 26, 1850.

W. Spence, Esq., F.R.S., in the Chair.

The following paper was read :—

1. MONOGRAPHS OF CYCLOSTREMA, MARRYAT, AND SEPARATISTA, GRAY; TWO GENERA OF GASTEROPODOUS MOLLUSKS. BY ARTHUR ADAMS, R.N., F.L.S. ETC.

CYCLOSTREMA, Marryat.

Animal ignotum. Operculum — ? *Testa depressa, perspectivoumbilicata; apertura circularis.*

Shell depressed; aperture circular; umbilicus very large, with the volutions of the whorls visible within it.

CYCLOSTREMA CANCELLATA, Marryat. *C. testâ albâ, lineis longitudinalibus et transversis elevatis decussantibus inde cancel-*

latd; aperturæ labiis cancellatis; cancellis transversim striatis.

Hab. in insulis Philippinis.

Shell white, cancellated, with elevated, decussating transverse and longitudinal lines; aperture with the lips cancellated; cancelli transversely striated.

Hab. Baszay, island of Samar, 6 fathoms, coral sand; *H. C.* (Mus. Cuming.)

Cyclostrema cancellata, *Marryat*, *Trans. Linn. Soc.* 1818, vol. xii. p. 338.

CYCLOSTREMA NIVEA, Chemnitz. *C. testâ orbiculari, nived, pel-lucidâ; spirâ depressâ, anfractibus transversim costellatis, costellis regularibus, superis distantioribus; interstitiis leviter concavis; suturis profundis subcanaliculatis; labro simplici; umbilico peramplo.*

Hab. in maribus Occidentalibus.

Shell orbicular, snowy white, transparent; spire depressed, whorls transversely ribbed, ribs regular, the upper fewer and wider apart; interstices slightly concave; sutures deep, slightly channeled; lip simple; umbilicus very large.

Hab. Seas of India. (Mus. Cuming.)

Turbo niveus, Chemnitz, *Conch. Cab.* vol. x. pl. 165. f. 1587 and 1588. *Delphinula nivea*, *Reeve*. *Delphinula lævis*, *Kiener*.

CYCLOSTREMA REEVIANA, Hinds. *C. testâ orbiculari, subdiscoïdâ, muticâ; spirâ depressiusculâ, anfractibus convexis, longitudinaliter carinulatis, carinulis numerosis, superis distantioribus; interstitiis liris obliquis corrugato-clathratis; labro simplici; umbilico peramplo.*

Hab. —?

Shell orbicular, somewhat discoid; spire rather depressed, longitudinally keeled, keels numerous, upper ones wider apart; interstices latticed in a wrinkled manner, with oblique ridges; inner lip simple; umbilicus very large.

Hab. Straits of Malacca, 17 fathoms. (Mus. Cuming.)

Delphinula Reeviana, *Hinds*, *Proc. Zool. Soc.* 1843.

CYCLOSTREMA COBIJENSIS, Reeve. *C. testâ turbinatâ, minutâ, anfractibus convexis, carinulis transversis et longitudinalibus æquidistantibus regulariter clathratis; umbilico mediocri; labro simplici.*

Hab. Cobija, Peru.

Shell turbinated, very small; whorls convex, regularly latticed, with equidistant, transverse and longitudinal ribs; umbilicus moderate; lips simple.

Hab. Port of Cobija, Peru, under stones in rocky places, low water; *H. C.* (Mus. Cuming.)

Delphinula Cobjensis, *Reeve*, *Proc. Zool. Soc.* 1843.

CYCLOSTREMA SPIRULA, Adams. *C. testâ orbiculari, discoïdâ, evolutâ; spirâ depresso-concavâ, anfractibus rotundatis, primis*

contiguâ, ultimâ distinctâ, transversim costulatis, costellis subconfertis, æquidistantibus; interstitiis tenuissimè longitudinaliter striatâ; aperturâ circulari; peritremate continuo.

Hab. in insulis Philippinis. (Mollusca, Pl. VIII. fig. 22.)

Shell orbicular, discoid, evolute; spire depressly concave; whorls rounded, the first contiguous, the last separate, transversely ribbed, ribs equidistant, close together; interstices very finely longitudinally striated; aperture circular; peritreme continuous.

Hab. Philippine Islands. (Mus. Cuming.)

CYCLOSTREMA CINGULIFERA, Adams. *C. testâ orbiculari, nitidâ; spirâ depressâ, anfractibus rotundatis, carinulis transversis, acutis, æquidistantibus; interstitiis (sub lente) tenuissimè longitudinaliter striatis; aperturâ subcirculari, supra subangulatâ; umbilico mediocri.*

Hab. in insulis Philippinis.

Shell orbicular, shining; spire depressed; whorls rounded, with equidistant, small, acute, transverse keels; interstices (under the lens) very finely longitudinally striated; aperture subcircular, angulated above; umbilicus moderate.

Hab. Dumaguete, island of Zebu, 4 fathoms; *H. C.* (Mus. Cuming.)

CYCLOSTREMA NITIDA, Adams. *C. testâ orbiculari, lævi, tenui, nitidâ; spirâ elevatiusculâ, anfractibus prope suturam subangulatis; suturis profundis, subcanaliculatis; aperturâ subcirculari, supra angulatâ; umbilico magno, peromphalo angulato, acuto.*

Hab. in insulis Philippinis.

Shell orbicular, smooth, shining; spire rather elevated; whorls somewhat angulated near the suture; suture deep, subcanaliculated; aperture subcircular, angulated above; umbilicus large, peromphalus acutely angulated.

Hab. Catanuan and Sual, island of Luzon, 10 fathoms, sandy mud; *H. C.* (Mus. Cuming.)

CYCLOSTREMA PLANORBULA, Adams. *C. testâ orbiculari, planorbulâ; spirâ depressâ, anfractibus lævibus, rotundatis, suturis distinctis; aperturâ subcirculari, supra angulatâ; umbilico permagno, patulo.*

Hab. in insulis Philippinis.

Shell orbicular, planorbular; spire depressed, whorls smooth, rounded, suture distinct; aperture subcircular, angulated above; umbilicus very large and open.

Hab. Sual, island of Luzon, 10 fathoms, sandy mud; *H. C.* (Mus. Cuming.)

CYCLOSTREMA PLANA, Adams. *C. testâ orbiculari, dorso plano-convexâ; spirâ depressâ, anfractibus planis, supra transversim striatis, infra lævibus; aperturâ subcirculari, supra angulatâ; umbilico peramplo, anfractibus intus conspicuis.*

Hab. in insulis Philippinis.

Shell orbicular, back plano-convex; spire depressed, whorls flat-

tened, above transversely striated, below smooth; aperture subcircular, angulated above; umbilicus very wide, the whorls visible within it.

Hab. Dumaguete, island of Negros; *H. C.* (Mus. Cuming.)

CYCLOSTREMA MICANS, Adams. *C. testá turbinatá, minútá, albá, nitidá, anfractibus convexis, longitudinaliter obliquè costellatis, transversim carinulatis, carinulis nodulosis; umbilico mediocri; aperturá circulari; peristomate continuo, incrassato.*

Hab. Australia.

Shell turbinated, small, white, shining, whorls convex, longitudinally obliquely ribbed, transversely carinated, keels nodulous; umbilicus moderate; aperture circular; peristome continuous, thickened.

Hab. Port Lincoln; *Metcalf.* (Mus. Cuming & Metcalf.)

CYCLOSTREMA ELEGANS, Adams. *C. testá orbiculari, discoided, tenui, semipellucidá; spirá depressá, anfractibus rotundatis, transversim omnino striatis; suturis distinctis; aperturá subcirculari, supra angulatá; umbilico peramplo.*

Hab. in insulis Philippinis.

Shell orbicular, discoid, thin, semipellucid; spire depressed, whorls rounded, entirely transversely striated; suture distinct; aperture subcircular, angulated above; umbilicus very wide and open.

Hab. Sibonga, island of Zebu, 10 fathoms, sandy mud; *H. C.* (Mus. Cuming.)

CYCLOSTREMA SULCATA, Adams. *C. testá orbiculari, discoided; spirá planiusculá, anfractibus convexis, costellis transversis confertis regularibus, interstitiis profundè sulcosis; suturis profundis canaliculatis; umbilico patulo; peromphalo lævi.*

Hab. in insulis Philippinis.

Shell orbicular, discoid; spire rather flattened, whorls convex, with regular, transverse, small ribs, numerous and close together, interstices deeply grooved; suture canaliculated; umbilicus open; umbilical area smooth.

Hab. Tambah, island of Negros, coarse sand, 6 fathoms; *H. C.* (Mus. Cuming.)

CYCLOSTREMA ANGULATA, Adams. *C. testá orbiculari, discoided; spirá depressá, anfractibus transversim costellatis, costellis regularibus, æquidistantibus, interstitiis tenuissimè striatis; anfractu ultimo biangulato, supra costellato, in mediá plano, infra costellato; aperturá subangulatá; peritremate interrupto; umbilico permagno.*

Hab. in insulis Philippinis.

Shell orbicular, discoid; spire depressed, whorls transversely costellated; ribs small, equal, equidistant, interstices very finely striated; last whorl biangulated, costellated above, smooth in the middle, and ribbed beneath; aperture somewhat angulated; peritreme not continuous; umbilicus very large.

Hab. Sibonga, island of Zebu, 10 fathoms, sandy mud; *H. C.* (Mus. Cuming.)

SEPARATISTA, Gray.

Animal ignotum. Operculum — ? *Testa orbicularis, subdiscoidea, anfractibus primis contiguis, ultimo distincto; aperturâ patulâ, effusâ, angulis subcanaliculatis; umbilicus magnus, infundibuliformis, usque ad apicem.*

Shell orbicular, somewhat discoid, the first whorls contiguous, the last disunited; aperture wide-spreading, angulated; umbilicus large, infundibuliform, the whorls visible within as far as the apex.

The *Cornu* of Schumacher and the *Lippistes* of Montfort, founded upon the *Argonauta cornu* of Fichtel, appear to belong to *Carinaria* of Lamarck. *Steira* of Eschscholtz would seem by the figure given in Oken's 'Isis' to be an *Atlanta* badly drawn in an inverted position, and indeed is founded upon the "Corne d'Ammon vivant" of Lesueur, *Atlanta Peronii*.

Separatista, Gray (not described).

SEPARATISTA GRAYII, Adams. *S. testâ spirâ depressâ, anfractibus carinulis quinque transversis; aperturâ oblongo-transversâ; labio reflexo, anticè rotundato.*

Hab. apud Promontorium Bonæ Spei.

Shell with the spire depressed, whorls with five transverse keels; aperture transversely oblong; inner lip reflexed, anteriorly rounded.

Hab. Cape of Good Hope. (Mus. Cuming.)

SEPARATISTA CHEMNITZII, Adams. *S. testâ spirâ elevatâ, anfractibus carinulis tribus transversis; aperturâ subcirculari; labio subreflexo, anticè producto, angulato.*

Hab. in insulis Philippinis.

Shell with the spire elevated, whorls with three transverse keels; aperture subcircular; inner lip somewhat reflexed, anteriorly produced and angulated.

Hab. Island of Bureas, Philippines; *H. C.* (Mus. Cuming.)

Turbo separatista, *Chemnitz*.

PROFESSOR OWEN communicated a Memoir *, in continuation of his previous papers published in the Transactions (vol. iii. pp. 243, 307, 345), on the Gigantic Wingless Birds of New Zealand.

Having in the previous Memoirs determined and referred to their genera and species the different bones of the leg, he made those of the foot the subject of the present communication, which was illustrated by the exhibition of an extensive series of remains from both the North and South (or Middle) islands of New Zealand; comprising the entire series of phalanges of one and the same foot of the *Palapteryx robustus*, a gigantic species from Waikawaite; a similarly complete series of the *Dinornis rheides*; and series more or less incomplete of the phalanges of the *Dinornis giganteus*, *Palapteryx ingens*, and other genera and species of the singular extinct wingless birds of New Zealand. The characteristics of the different phalanges

* This paper will be printed in the Transactions, vol. iv. Part 1.

were minutely detailed, and the different proportions of the toes characteristic of different species, especially of the two most gigantic, viz. the *Dinornis giganteus* of the North island, and the *Palapteryx robustus* of the turbary deposits of the Middle island. The adaptation of the claw-bones for scratching up the soil was obvious from their shape and strength. The generic distinction of *Palapteryx* had previously been indicated by a slight depression on the metatarsus, supposed by the author to be for the articulation of a small back-toe, as in the *Apteryx*; and he had since received a specimen of the principal bone of that toe, which was exhibited and described. A nearly entire sternum, a portion of a minute humerus, and a cranium of one of the smaller species of *Dinornis*, were also exhibited and described.

This magnificent series of remains of great New Zealand birds had been collected chiefly by the late Colonel Wakefield, and had been transmitted to the author through the kind interest of J. R. Gowen, Esq., a Director of the New Zealand Company.

March 12, 1850.

W. Spence, Esq., F.R.S., in the Chair.

The following papers were read :—

1. FIRST THOUGHTS ON A PHYSIOLOGICAL ARRANGEMENT OF BIRDS. BY EDWARD NEWMAN, F.L.S., F.Z.S. ETC.

The systematic arrangement of the Class Aves is more unsettled than that of any other portion of the animal kingdom, a circumstance that may fairly be attributed to our attaching too high a value to characters purely structural or adimensional, while we neglect others more intimately connected with reproduction; in a word, to the substitution of physical for physiological characters. In mammals, reptiles and fishes, we have a primary division based entirely on physiology: thus mammals are placental or marsupial; reptiles are oviparous or spawning; fishes are viviparous or spawning; and this primary division of these classes is admitted by all physiologists to be strictly natural. Notwithstanding, however, the purely physiological character, on which these primary divisions depend, it is found that physical characters harmonise with physiological, and that intimate structure in each instance bears out physiological difference. It were not wise altogether to discard structural differences even in the outset of an inquiry into system, but it is necessary to use them rather as corroborative than as indicative; and above all to draw a distinct and permanent line between such as are truly intimate and such as are purely adaptive. It has always appeared to me that one of the chief advantages of an extensive Vivarium like that possessed by our Society is the opportunity it affords for studying animated nature in an ani-

mated state, for ascertaining physiological as well as physical characters. If then we avail ourselves of the opportunities which are or ought to be thus afforded us, we shall find that in the very outset of life a physiological character of the most obvious kind will divide birds into groups as distinct as are the placental and marsupial mammals, or the cartilaginous and bony fishes. Prior to the extrusion of the egg, observed facts bearing on this subject are so few and so unconnected that they cannot be rendered available as affording evidence on the question to be considered; it is therefore compulsory that our comparisons begin at that moment when the condition of the young becomes patent by the breaking of the shell. Commencing the inquiry at this point, which may safely be regarded as analogous to the birth of a placental animal, we have this obvious grand division of the class :—

1. *Hesthogenous Birds*.—In these, immediately the shell is broken the chick makes its appearance in a state of adolescence rather than infancy: it is completely clothed, not with such feathers as it afterwards wears, but still with a close, compact, and warm covering: it possesses the senses of sight, hearing, smelling, &c. in perfection: it runs with ease and activity, moving from place to place at will: it perfectly understands the signals or sounds uttered by its parent, approaching her with alacrity when invited to partake of food she has discovered, or hiding itself under bushes, grass, or stones, when warned of danger; in either case exhibiting a perfect and immediate appreciation of its parent's meaning: it feeds itself, pecking its food from the surface of the earth or water, and not receiving it from the beak of its parent: although entering on life in this advanced state, it grows very slowly, and is long in arriving at maturity. When full-grown it uses its feet rather than its wings: it trusts much to its legs for means of escape: when it flies, it moves through the air by a series of rapid, powerful, laboured strokes of the wing, and invariably takes the earliest opportunity of settling on the land or water, not on trees; it never takes wing for recreation or food, but simply as a means of moving from place to place: it is polygamous in its habits; the number of females predominating over the males: the males are pugnacious, they accompany the females only until incubation has commenced, and abandon the duties of incubation and the care of the young solely to the females: the females make little or no nest, a depression scratched on the surface of the soil generally sufficing: the eggs are large in comparison to the size of the bird: neither sex sings, or attempts to imitate the voice of men or animals. Birds included in this division approach more nearly to mammals than do those which it excludes: for instance, the habitual use of land or water for progression, the swiftness of foot, the strength and muscular development of the legs, the polygamous habits, the want of the extraordinary instinct of nest-making, are characters which, while they seem to degrade these birds as birds, certainly raise them in the list of animals, because they are thus brought nearer those animals which suckle their young, and which are always placed at the head of the animal kingdom. In an econo-

mical point of view, and considered in reference to man, the flesh of these birds is wholesome, nutritious, and is generally considered highly palatable. The division comprises the following orders, in each of which partial exceptions to one or other of these general characters occur :—

1. Gallinæ, or the Poultry order.
2. Brevipennes (*Cuvier*), or the Ostriches.
3. Pressirostres (*Cuvier*), or the Plovers.
4. Longirostres (*Cuvier*), or the Snipes.
5. Macroductyli (*Cuvier*), or the Rails.
6. Plongeurs (*Cuvier*), or the Divers.
7. Lamellirostres (*Cuvier*), or the Ducks.

2. *Gymnogenous Birds*.—In these, when the shell is broken, the chick makes its appearance in a state of helpless infancy : it is naked, blind, and incapable of locomotion : it cannot distinguish its parent by means of its senses : it gapes for food, but does not distinguish between proper food offered by its parent, and a stick or a finger held over it : it cannot feed itself, and would die were not food placed in its mouth : it rapidly attains its full size, often before leaving the nest. When full-grown it uses its wings rather than its feet : it flies with a succession of deliberate and easy strokes : it takes wing for recreation and for food, and not merely for the purpose of moving from place to place : it is strictly monogamous ; the sexes being equal in number : males share with females the cares of incubation and feeding the young until these are able to shift for themselves. Birds possessing these characters build elaborate nests in trees, and perch in trees rather than on the ground : many of them sing melodiously ; others imitate, with wonderful facility, the voice of man or of animals. As an economical character in connexion with man, their flesh is bitter and unpalatable, often offensive and disgusting ; hence man has never domesticated them for purposes of food. These are birds *par excellence* : they possess in perfection the essential characters of birds : in the habitual use of air for progression and of trees for resting, in the want of abilities for terrestrial progression, in strength and bulk of pectoral muscle, in monogamous habits, in the fabrication of nests, in power of song, they are raised as birds, but degraded as animals, since in all these characters they recede from those animals which suckle their young. The division comprises the following groups, in each of which exceptions to one or other of the general characters occur :—

1. Totipalmes (*Cuvier*), or the Pelicans.
2. Longipennes (*Cuvier*), or the Gulls.
3. Accipitres, or the Birds of Prey.
4. Cultriostres (*Cuvier*), or the Herons.
5. Passeres, or the Sparrow order.
6. Grimpeurs (*Cuvier*), or the Climbing birds ; and
7. Columbæ, or the Pigeons.

2. ON A NEW SPECIES OF *LYMNÆA* FROM THIBET.
 BY LOVELL REEVE, F.L.S., F.Z.S. ETC.

LYMNÆA HOOKERI. *Lymn. testâ ovata, tenuiculâ, conspicuè umbilicatâ, anfractibus quatuor ad quinque, convexis, superne depresso-rotundatis, suturis subimpressis, aperturâ orbiculari-ovatâ, marginibus lamina latiusculâ subverticali conjunctis; sordide olivaceo-fusca.*



The above-described freshwater mollusk, collected by Dr. Hooker on the Thibetian or north side of Sikkim Himalaya, at 18,000 feet elevation, belongs to the same type as our well-known *Lymnæa peregra*, and affords an interesting addition to the evidence which has been in part collected touching the wide geographical distribution of corresponding forms of plants and animals over those parts of Europe and Asia where there are no extensive mountain-barriers. The European *Lymnæa stagnalis* has been collected as far east as Afghanistan, and the typical form of *Lymnæa peregra* is very characteristic in this species from Thibet. A depression of the whorls next the sutures, which gives a more orbicular form to the aperture, and a conspicuous umbilicus, which is not in any degree covered by the columellar lamina, prove it to be specifically distinct from *L. peregra*; and these characters do not appear in the various modifications of that species arising out of its more or less ventricose growth, or more or less attenuated convolution. South of the Himalaya range, where Dr. Hooker reckons the snow-line to be 5000 feet lower than on the north side, and 3000 feet lower than the locality inhabited by this species, the *Lymnææ* are of quite a different type, more especially in the plains of Bengal, where the shell, owing to its being formed in so much warmer a temperature, is of stouter growth, and characterized by some design of colouring. The European types of *Lymnæa*, ranging over Russia and Siberia, appear abundantly in the stagnant waters of North America; and some are identical in species. *L. elodes* of Say, inhabiting Pennsylvania, is doubtless the same species as the European *L. palustris*; *L. truncatula* of the same author appears to be identical with *L. desidiosa*; and the *L. peregra*, represented by *L. Hookeri* in Thibet, is represented in Pennsylvania by Say's *L. catascopium*. The *Lymnææ* of Australia are of a remarkable and very distinct type from either of those mentioned above.

I have much pleasure in naming this Thibetian *Lymnæa* after the indefatigable traveller, whose researches into the natural and physical history of that remote country into which few have penetrated, are likely to be attended with such important results. I have placed the specimens in the British Museum.

The figure in outline is of the natural size.

No. CCIV.—PROCEEDINGS OF THE ZOOLOGICAL SOCIETY.

3. ON THE ANIMAL OF LIOTIA; WITH DESCRIPTIONS OF NEW SPECIES OF DELPHINULA AND LIOTIA, FROM THE CUMINGIAN COLLECTION. BY ARTHUR ADAMS, R.N., F.L.S. ETC.

(Mollusca, Pl. VIII. fig. 18, 19, 20.)

An examination of the animal of *Liotia Peronii* tends to confirm the generic importance of a small group hitherto confounded with *Cyclostrema* and *Delphinula*, but which had been justly recognised by Mr. Gray under the name of *Liotia*. The shell is known by its thickened peritreme; the operculum is peculiar, and the habits are peculiar in living at considerable depths, while *Delphinula* proper are chiefly littoral. In *Liotia* the head is probosciform, the tentacles subulate, the eyes on conspicuous peduncles at their outer bases; there are no intertentacular lobes, but a conical lobe on each side of the head external to the eye-peduncles; the lateral membrane of the foot is undulated, and furnished posteriorly with three cirrhi.

The operculum is arctispiral, the volutions being very narrow, numerous, and covered with a calcareous deposit, which is articulated at regular intervals, giving the upper surface of the operculum a tessellated appearance; the periphery is ornamented with radiating, horny fibres.

LIOTIA PULCHERRIMA, Adams. *L. testâ subdiscoïdæ; spirâ elevatiusculâ, anfractibus rotundatis, liris transversis et longitudinalibus elegantissimè cancellatâ, liris transversis muricatis; labro expanso, duplicati, radiatim fimbriato; umbilico per-amplâ, crenulatâ.*

Hab. apud Promontorium Bonæ Spei. (Mollusca, Pl. VIII. fig. 21.)

Shell subdiscoïd; spire slightly elevated, whorls rounded, very elegantly cancellated with transverse and longitudinal raised ridges, the transverse being muricated; outer lip expanded, with a double peritreme, each being radiately fimbriated; umbilicus very large, the margins crenulated.

Hab. Cape of Good Hope. (Mus. Cuming.)

LIOTIA AFFINIS, Adams. *L. testâ globosâ; spirâ subprominulâ, anfractibus rotundatis, transversim elevato-striatis, costis variciformibus longitudinalibus, distantibus, angulatis, mucronatis; anfractuum parte inferiori serie unice foraminum; labro expanso; umbilico patulo, crenulatâ.*

Hab. in littoribus Australiæ.

Shell globose; spire rather prominent, whorls rounded, transversely elevately striated, with variciform longitudinal ribs, wide apart, angulated, and with the angles furnished with sharp points; lower part of the whorls with a single row of holes; outer lip expanded; umbilicus wide, crenulated.

Hab. Australia. (Mus. Cuming.)

A species partaking of the characters of *L. scalarioides* and *L. varicosa* of Reeve, but which can be referred to neither.

LIOTIA DUPLICATA, Adams. *L. testâ orbiculari; spirâ depressâ, anfractibus transversim et longitudinaliter costatis; costis transversis duabus, tuberculatis; anfractuum parte inferiori planâ; umbilico amplo, perspectivo, crenulato.*

Hab. in insulis Philippinis.

Shell orbicular; spire depressed, whorls transversely and longitudinally ribbed; transverse ribs two, tuberculated; the lower part of the whorls smooth; umbilicus very large, the other whorls visible within, margin crenulated.

Hab. Cagayan, province of Misamis, Isle of Mindanao, Philippines. (Mus. Cuming.)

LIOTIA NODULOSA, A. Adams. *L. testâ orbiculato-depressâ; spirâ complanatâ, transversim striatâ, ultimo anfractu costis transversis duabus in medio puncto sulcatis et nodulis magnis subdistantibus instructis, infra serie punctorum circa regionem umbilicalem; aperturâ orbiculari, peristomate reflexo puncto fimbriato, umbilico patulo margine crenulato.*

Hab. in insulis Philippinis. (Mus. Cuming.)

DELPHINULA CORONATA, Adams. *D. testâ subdiscoïdâ, albâ, nigro lineatâ; anfractibus rotundatis, supra, spinis squamæformibus subramosis nigricantibus sursum curvatis coronatâ; anfractuum parte alterâ spinis brevioribus nigris in seriebus dispositis; spirâ plano-convexâ.*

Hab. in littoribus Australiæ.

Shell subdiscoid, white, with black lines; whorls rounded, coronated above with blackish subramose scale-like spines curved upwards, the other part of the whorls with shorter black spines arranged in parallel rows; spire plano-convex.

Hab. Cape Upstart, North Australia, in crevices of rocks at low water; *Jukes*. (Mus. Cuming.)

DELPHINULA EURACANTHA, Adams. *D. testâ subdiscoïdâ, albidâ fusco rubroque variegatâ, anfractibus supra lævigatis, superne angulatis, angulo spinis squamæformibus grandibus latis decurvatis ornato; anfractuum parte inferiori serie unied spinarum et squamarum in seriebus parallelis dispositis ornata; umbilico amplo, squamis muricatis armato, peromphalo nodoso.*

Hab. in insulis Philippinis.

Shell subdiscoid, whitish varied with red and brown; whorls smooth above, angulated superiorly, the angle ornamented with large wide decurved scale-like spines; lower part of the whorl with a single series of spines and numerous parallel rows of scales; umbilicus wide, armed with muricated spines, margin nodose.

Hab. Isle of Mindora, Philippine Islands; *H. C.* (Mus. Cum.)

Like *D. aculeata*, Reeve; but the spinose processes are broad and deflexed, and there is a single row of large spines on the under part.

DELPHINULA CALCAR, Adams. *D. testâ orbiculari, discoïdâ; spirâ depressâ, albâ, anfractibus angulatis acutis, peripheriâ serie unied spinarum radiatim stellatâ, spinis triangularibus*

compressis prominentibus ; anfractuum parte inferiore plani ; umbilico patulo, crenulato.

Hab. in insulis Philippinis.

Shell orbicular, discoid ; spire depressed, white, whorls sharply angulated, periphery with a single series of prominent broad triangular compressed spines radiately disposed ; lower part of whorls smooth ; umbilicus wide, crenulated.

Hab. Catuanan, province of Tayabas, island of Luzon, sandy mud, 10 fathoms ; *H. C.* (Mus. Cuming.)

A small species, partaking somewhat of the characters of *D. stellaris*, Adams and Reeve, but much more depressed, and the lower part of the whorls simple.

March 26, 1850.

W. Yarrell, Esq., V.P., in the Chair.

The following papers were read :—

1. ON A LEECH NEW TO THE BRITISH FAUNA.

By J. E. GRAY, Esq., F.R.S.

Mr. Hoffmann lately sent to the Zoological Gardens a living specimen of a very large leech which he had found near his house in the Regent's Park. It has been preserved in fluid, and now forms part of the Collection of British Animals in the British Museum.

It proved to be an adult specimen of *Trochetia subviridis*, Dutrochet (*Lamk. Hist. A. s. F.* v. 523), well-figured in the 2nd edition of Moquin-Tandon's 'Monograph of Hirudines,' t. 4. It is a very interesting addition to the fauna. It is the giant of the family, this specimen being more than 7 inches long.

2. ON THE OCCURRENCE OF *REGALECUS GLENE* AT REDCAR, YORKSHIRE, IN 1850. By J. E. GRAY, Esq., F.R.S.

A specimen of this fish was cast ashore on Redcar Sands, Yorkshire, on Thursday, the 3rd of January 1850. "The fish was alive when found. Length without the tail-fin, which is wanting, about 11 feet ; width at the broadest part, 12 inches ; weight, 4 stone 10 lbs."

It was salted and exhibited at Redcar. During the exhibition the rays of the dorsal and ventral fins were almost entirely destroyed, and it broke transversely into three nearly equal lengths on being moved from the sand.

It was eventually sent to London, and now forms part of the Collection of British Animals in the British Museum. The specimen, when it arrived in London, agreed in general appearance and in all essential characters with the specimen from Cullercoats which was exhibited in London last year. Mr. Wrightson, who had the care of it at Redcar, considered, because it had no expanded forked tail, that the tail was wanting.



W. H. Bailey

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Fig 1 a b c *Helix vellicata* Forbes
 2 a b H. *Kellerti*
 3 a b H. *Pandora*
 4 a b H. *labyrinthus* var.
 5 a b *Bulimus achatinellinus* Forbes.

Fig 6 a b *Bulimus chemnitzoides* Forbes
 7 a b *finbriatus* .
 8 a b *Succinea cingulata* .
 9 a b *Cyclotoma purum* .
 10 *Fusus Kellerti* .

3. NOTE ON *Callichthys* AND *Anableps*.

By J. P. G. SMITH, Esq.

The flesh of *Callichthys*, when cooked, is of a fine deep yellow colour, and in substance is somewhat cheesy or buttery on the tongue; it is very rich in flavour: no cleaning of the intestines appears to be necessary before preparation for the table.

In the creeks by which the island of Mexianna is intersected, these fish literally swarm and keep the waters alive and in a state of constant disturbance. I have witnessed them crossing a log of wood, which was lying in the water and intercepted the passage, in such numbers that they quite concealed it from view; and the people, when they wanted a dish, were in the habit of going down to a favourable spot and picking them out with their hands, without going into the water.

Anableps swims in small shoals with the eyes above the surface of the water, generally close to the shore, and so near together that I have shot twenty to thirty at a time by firing a gun among them; their flesh is very sweet, and not unlike a smelt in taste.

4. ON THE SPECIES OF MOLLUSCA COLLECTED DURING THE SURVEYING VOYAGES OF THE *HERALD* AND *PANDORA*, BY CAPT. KELLETT, R.N., C.B., AND LIEUT. WOOD, R.N. BY PROFESSOR EDWARD FORBES, F.R.S.1. *On the Land-Shells collected during the Expedition.*

(Mollusca, Pl. IX.)

Officers employed on a hydrographical survey have seldom time or opportunity for making an extensive collection of land-shells. In the assemblage of mollusks collected by Capt. Kellett and Lieut. Wood, there are twenty-eight species, of which eight are undescribed forms. These have been collected at various points between the coast of the Equador to the south and Vancouver Island to the north, the Gelepagos Islands, Pitcairn's Island, and the Sandwich Isles. Unfortunately, in consequence of the mixing of unlabeled specimens, the precise locality of several of the species cannot now be determined.

Of the genus *Helix* there are nine species. Of these, *H. Townsendiana*, *Nuttalliana* and *Columbiana* are certainly from the neighbourhood of the Columbia river. *Helix Kellettii* and *Pandora*, both new, are probably from the same country, though the box in which they were contained was marked "Santa Barbara." *Helix areolata* bears no indication of its locality. *Helix labyrinthus*, variety *sipunculata*, is a very curious modification of *H. labyrinthus*, and, like its known near relations, comes from Panama. *Helix ornatella* (known also as *H. Adamsi*) was collected in Pitcairn's Island, where it had originally been observed. A single specimen of the common European *Helix aspersa* is marked "Santa Barbara," and probably owed its presence, wherever it was found, to transport by Europeans.

Of the genus *Bulimus* fourteen species were collected. Among the most interesting of these are seven species, two of them new, from

Chatham Island, one of the Gelepagos group. Five, viz. *nux*, *calvus*, *eschariferus*, *unifasciatus*, and *rugulosus*, are described forms; two, to which I have applied the names *chemnitzoides* and *achattellinus*, are new, and very curious. Of these latter, the first is singularly isolated in many of its features, though bearing a resemblance sufficient to indicate an affinity with certain elongated and turreted *Bulimi*, natives of South America. The other is equally distinct from any known members of this genus; but, moreover, instead of linking, as the majority of the Gelepagos land-shells do, the fauna of those singular islands with the American continent, rather points, as it were, in the opposite direction, and distantly indicates affinity with the fauna of the Sandwich Isles.

Unfortunately less certain as to exact locality, though contained in a box labeled "Panama," is a curious small elongated *Bulimus*, to which I have given the name *finbriatus*. A form such as this, suggests, when we bear in mind the varied characters of its congeners, considerable doubts as to the value of the generic sections at present generally received among the Pulmoniferous Mollusca. We speak of *Bulimus*, *Helix*, *Pupa*, *Achatina*, and *Balea*, as if they were so many marked groups, the species in each assimilating to ideal generic types, whereas the difference between certain forms of so-called *Bulimi* and others placed under the same generic name is greater than between many *Bulimi* and *Helices* or *Pupæ*. Without assenting to the views of Férussac, which would have amalgamated the genera into one, on account of the similarity in external characters of the soft parts of the animal, and fully admitting that in certain tribes the shell alone may become a most important source of generic character—in other words, granting that in certain groups the sources of generic distinction may lie in the pneumo-skeleton—I do think that we have not yet attained a natural arrangement of the Pulmoniferous Mollusks, and until we have solved that problem, we shall be seriously impeded in the study of the laws of their distribution as well as of their organization.

Besides the *Bulimi* already named, there are specimens of *Bulimus iostomus*, *B. Hartwegii*, and a beautiful new species lately described and figured by Mr. Reeve under the name of *Bulimus Kellettii*, all probably from the Equador; *Bulimus alternatus*, from Panama; and *Bulimus miltecheilus*, marked from the Sandwich Islands, though this curious and beautiful shell is not known to inhabit that locality; nor have we evidence sufficient that the specimen brought home by Lieut. Wood was gathered there. Hitherto it is only known from "San Christoval, south-eastern island of Solomon's Group, north-east coast of New Holland" (Reeve), from which locality the specimens in Mr. Cuming's collection were obtained, and the single example now referred to may have possibly been brought away from the same place.

Of the curious genus *Achatinella*, two species, *livida* and *alba*, are in the collection, both procured at the Sandwich Islands.

Of *Succinea* there is a new species, marked from Mazatlan; I have named it *Succinea cingulata*.

There are two species of *Cyclostoma*, the fine *C. grande* (no locality is attached to it), and an equally beautiful one which I have named *C. purum*.

The following diagnoses of the new species in the collection have been modeled on those of Dr. L. Pfeiffer, whose admirable 'Monographia Heliceorum Viventium' is one of the most valuable contributions to Malacology that have been published for many years.

HELIX PANDORÆ. *H. testâ obtectè perforatâ, depresso-globosâ, tenui, rugulosâ, concentricè minutissimè striatâ, anfractibus supra peripheriam fuscis, infra et prope peripheriam albidis fusco cingulatâ, basi albidis; aperturâ rotundatâ intus fuscâ albido-fasciatâ, margine interno incrassato albo; peristomate reflexiusculo, extus albo-labiato, margine columellari dilatato, reflexo, umbilicum occultante.*

Diam. max. 17, min. 16, alt. 14 mill. (Pl. IX. fig. 3 a, b.)

Collected near the Straits of Juan del Fuco; allied to the last species, but very distinct.

HELIX KELLETTII. *H. testâ angustè umbilicatâ, depresso-globosâ, tenui, rugulosâ, granulatâ, fulvâ, spirâ subturbinatâ, sordidè flavo conspersâ, rufo-unifasciatâ, anfractibus 6, converiusculis, ultimo ad peripheriam fasciâ pallidâ cincto, basi subinflato; aperturâ lunato-rotundatâ, intus pallide fuscâ, unifasciatâ; peristomate reflexiusculo, margine columellari dilatato, reflexo, umbilicum occultante.*

Diam. max. 22, min. 19, alt. 19 mill. (Pl. IX. fig. 2 a, b.)

This species is nearly allied to *Helix Californiensis*, Lea. It differs in the more pyramidal contour of the spire, in the less tumid body-whorl, and consequently differently shaped, more lunate, slightly elongated mouth. The margin of the mouth is more reflected.

HELIX VELLICATA. *H. testâ apertè umbilicatâ, tenui, convero-depressâ, subnitidâ, sulcato-striatâ, striis minutissimis spiralibus decussatâ, læte viridibus; spirâ converiusculâ, anfractibus 6, ultimo rotundato magno, anticè dilatato, subdescendente; aperturâ perobliquâ, lunato-oblongâ; faux alba, peristomate margine sub-reflexo, supernè deflexo-sinuato.*

Diam. max. 22, min. 18, alt. 8 mill.

From Panama? (Pl. IX. fig. 1 a, b, c.)

Distinguished from its near allies by the peculiar deflexion of the upper portion of the lip-margin.

BULIMUS CHEMNITZIOIDES. *Bul. testâ subperforatâ, turrito-subulatâ, regulariter costatâ, costis numerosis, nitidulis, flavidulâ, fasciâ spirali fusco-purpureâ cinctâ; anfractibus 14, ultimo $\frac{1}{2}$ longitudinis subæquante, basi fusco-purpureo; columellâ subrectâ, albidâ; peristoma simplex, acutum; margine externo supernè arcuato; aperturâ ovali-oblongâ.*

Long. 19, diam. 4 mill.; apert. 3 mill. longa, 2 lata.

Chatham Island, Gelepagos. (Pl. IX. fig. 6 a, b.)

This beautiful species strikingly resembles a marine *Chemnitzia*.

It is very distinct from any known *Bulimus*, but has affinities with *B. terebralis*, *B. columellaris*, and *B. clausilioides*.

BULIMUS FIMBRIATUS. *Bul. testâ imperforatâ, subuliformi, tenui, costis longitudinalibus subarcuatis, lineis confertis parallelis in interstitiis costarum sculptâ, rufo-fuscâ, suturâ impressâ; anfractus 7-8, tumidi, ultimus $\frac{1}{2}$ longitudinis vix superans, infra medium obsoletè carinatus; columella subsimplex, ad basin aperturæ angulum formans; apertura subovalis; peristoma simplex.*
Long. 9, diam. 2 mill.; apert. 2 mill. longa, 1 lata.

(Pl. IX. fig. 7 a, b.)

In a box of shells labeled "Panama." The nearest ally of this very curious shell is the *Bulimus gracillimus* of Pfeiffer, from Cuba.

BULIMUS ACHATELLINUS. *Bul. testâ perforatâ, umbilico parvo, conicâ, obsoletè striatâ, nitidâ, flavâ, fusco-fasciatâ; suturâ cingulatâ, crenulatâ, albâ; anfractibus 7-8 convexiusculis, ultimo vix $\frac{1}{2}$ longitudinis æquante; apertura semiovalis, peristoma rectum, simplex, acutum; columella obsoletè contorta, margine columellari reflexo, perforationem semitegente.*

Long. 19, diam. 10 mill.; apert. 5 mill. longa, 4 lata.

(Pl. IX. fig. 5 a, b.)

This shell is from Chatham Island, Gelepagos; it is unlike any other known *Bulimus*, and its characters distinctly indicate affinity with the *Achatinellinæ*.

SUCCEINEA CINGULATA. *S. testâ oblongo-ovatâ, vix obliquâ, solidâ, striatâ, nitidâ, fulvâ-succineâ, sæpe spiraliter albo-lineatâ; spirâ exsertâ, obtusâ; anfractus 4, convexiusculi, ultimus $\frac{2}{3}$ longitudinis æquans; aperturâ elongato-ovatâ, supernè acutâ, basi obliquè pone axin recedente; columellâ arcuatâ.*

Long. 12, lat. 6 mill.; apert. 7 mill. longa, medio 3 lata.

(Pl. IX. fig. 8 a, b.)

This *Succinea* is distinct from any recorded by Pfeiffer. It is said to come from Mazatlan. The very fine white spiral lines are not always clearly marked in colour; they correspond with lines of deeper depression at intervals of the striae of growth.

CYCLOSTOMA PURUM. *C. testâ orbiculari, depressâ, albâ, nitidâ, spirâ elevatusculâ, luteâ; anfractibus sex, rotundatis, spiraliter sulcatis, sulcis numerosis, transversè striatis; aperturâ subcirculari, obliquâ, peritremate simplici; umbilico maximo; operculo —?*

Diam. 48, alt. 17 mill. (Pl. IX. fig. 9 a, b.)

Very near *C. Cumingii*, a species described by Mr. G. Sowerby from the island of Tumaco.

5. ON THE CHARACTERS OF THE GENERA PUSIONELLA AND CLAVATULA. BY J. E. GRAY, F.R.S. ETC.

In the List of Genera of Mollusca published in the Proceedings for 1848, I gave the name of *Pusionella* to a genus of shell, referring to the *Nefal* of Adanson and the *Murex pusio* of Born as the type.

This genus is easily characterized by the smooth thin periostraca, and the sharp-edged oblique plait which crosses the lower part of the canal. At the time I formed the genus, which contains several species in my collection, all coming from Africa, I was convinced that it was separate from the other zoophagous mollusca, from the characters assigned to it above, though I am aware that several zoologists were inclined to consider that they were scarcely sufficient for the formation of a generic group.

The examination of the operculum of the shells arranged in this group has shown that it affords a most excellent character, which separates it at once from all the other genera of the family. The operculum is formed of concentric laminae, with the nucleus or first-formed lamina placed on the straight front or inner side of the operculum, which is situated next to the pillar of the shell. With this peculiarity the genus must now be regarded as firmly established. This form of operculum had only before been observed in the genus *Bezoardica*.

The discovery of this character in shells which had been regarded by most authors as *Fusi*, induced me to examine the opercula of some other allied genera, and I was rewarded by the discovery that *Pleurotoma bicarinata*, which is very nearly allied in form to *P. coronata*, the type of the genus *Clavatula* of Lamarck's 'System,' has the operculum of the same shape and formed nearly in the same manner as that of the genus *Pusionella*; while *Pleurotoma Babylonica*, *P. Virgo*, and *P. oxytrophis*, which may be regarded as the typical *Pleurotomæ*, have the ovate lanceolate operculum with the nucleus on the acute apex, like the typical *Fusi*.

This being the case, it appears to me desirable that the genus *Clavatula* should be re-established, and restored to the species which has the operculum of this kind. Should it be considered necessary to separate from *Pleurotoma* the species which have a very short anterior canal, which have hitherto been regarded as *Clavatulae*, they may be called *Drilliae*, as that was the name which was first applied to them before they were confounded with the true *Clavatulae*.

These observations show the importance of studying the opercula of the different genera; and I may add, that the attention which I have been able to bestow on the subject has convinced me that they form quite as important a character for the distinction of the genera, and the arrangement of the genera into natural groups, as the structure and form of the shelly valve, or of the external form of the animals themselves; and this may well be believed, when we consider them, as I am inclined to do, as an imperfectly developed valve, and as homologous to the second valve of the bivalve shell.

April 9, 1850.

Prof. Owen, V.P., F.R.S., in the Chair.

The following papers were read :—

1. NOTICES OF AUSTRALIAN FISH. BY SIR JOHN RICHARDSON, M.D., F.R.S. ETC.

(Pisces, Pl. I. II. III.)

In the third volume of the 'Zoological Transactions;' the 'Magazine and Annals of Natural History,' vol. ix.; a report on the "Fish of New Zealand," made to the British Association in 1842; the Ichthyology of the Voyage of the Sulphur, and especially in the Ichthyology of the Antarctic Voyage of the Erebus and Terror, completed in February 1848, I have described various species of Australian fish. Among other sources of information to which I had recourse, a collection of drawings, made by Deputy Assistant Commissary General Neill, in 1841, at King George's Sound, is particularly valuable on account of the notices it contains of the habits and qualities of the fish. The drawings are so characteristic, that most of the species are easily recognised, but some novel forms could not be systematically described without specimens, and the opportunity now afforded me by Mr. Gray of inspecting a number of dried skins prepared on the spot by Mr. Neill, has given occasion to the present paper.

APISTES PANDURATUS, Richardson.

Radii.—B. 7; D. 17½; A. 3½; C. 12½; P. 14; V. 1½, spec.

(Pisces, Pl. I. fig. 3, 4.)

Among the various forms that the genus *Apistes* presents, the present one is remarkable for the elevation of the orbit, which rises in a semicircular protuberance, so high above the occiput as to give the hinder part of the head a relative depression like a Turkish saddle, and to render the snout and forehead almost vertical.

The mouth is terminal and small, and both jaws, with the chevron of the vomer and a round patch on each palatine bone, are furnished with minute, short villiform teeth. The intermaxillaries are moderately protractile, and the maxillary, whose dilated lower end drops below the corner of the mouth, has its posterior edge turned outwards producing a ridge. The nasal spines are thick, but acute, and are bent to the curve of the forehead. There is a narrow deep groove between them. This groove widens on the top of the head, where it is bounded by smooth ridges continued from the nasal spines, and in conjunction with them the raised edges of the orbits form an exterior furrow on each side. These four furrows and ridges end in obtuse eminences which cross from the superior-posterior angle of one orbit to the other. Behind them the skull sinks perpendicularly to the level of the nearly flat, depressed occiput, on which however the middle ridges are still visible. The preorbital is small, very uneven, and emits a



W. A. S. P. 1881

1 2 APLODONTIS MILES 3 4 APLODONTIS PANJURATUS

Prepared by H. A. S. P. 1881

strong spine whose acute point reaches back to the middle of the orbit. The second suborbital in crossing the cheek to the hollow of the preoperculum forms a stout ridge of oblique, somewhat twisted and striated eminences, none of them spinous. The preoperculum has a smooth vertical upper limb, which shows as a narrow, slightly elevated ridge. At its curve or angle there is a strong spine, longer than the preorbital one, but not reaching quite to the gill-opening. A short thick spine is adnate to its base above, and a little way below it there is an acute spine half as long, which is followed by three other angular or spinous points on the lower limb of the bone*. Two prominent but smooth ridges exist on the gill-plate without any spinous points. On the suprascapular region there are two ridges, the upper one having three thick, striated eminences with acute points, and the lower one has two such eminences, with two small points more posteriorly.

There are no scales on any part of the head, and there is a smooth space along the base of the dorsal, which is widest towards the shoulder; the space between the ventrals and the breast anterior to them, with the base of the pectorals and their axils, are scaleless; the rest of the body, including the belly and integuments adjoining the anal, is densely covered with small scales. The lateral line is marked by a series of small eminences and is straight.

Judging from the numbers given in the 'Histoire des Poissons,' and also from the examination of several species not described in that work, the branchiostegous rays seem to vary in the *Apistes* from five to seven. In the species now under consideration there are seven rays, but the lowest one is very slender, and so closely applied to the following one that it can be detected only by dissection.

The dorsal commences between the second points of the suprascapular ridges and extends to near the caudal. Its spinous portion is much arched; the spines are strong and acute, and the seventh one is the tallest, being equal to two-thirds of the greatest height of the body; the other spines are slightly graduated, but the foremost three diminish more abruptly. The last spine is rather more than one-half as long as the soft rays or than the tallest spine. The last soft ray is bound at its base to the back by membrane, but this membrane does not reach to the base of the caudal. The anal terminates rather further from the latter fin, and has three strong spines, the second being the stoutest and as long as the third one; the soft rays surpass them by about a fourth part. The pectorals are large and obliquely semi-oval, the lower rays being the shortest. Their rays are forked, which is a characteristic mark of the genus, and is not common in the Cottoid family. The ventrals are also rather large, exceeding the anal a little in length and in spread. Their spine stands behind the pectoral axil and under the fourth dorsal spine.

The length of the head exceeds the height of the body, and is contained thrice and one-half in the whole length of the fish, caudal included. Length of specimen $5\frac{1}{2}$ inches.

* In the figure, the angle of the mandible being strongly represented, looks like a fourth angular point.

APLOACTIS MILESII, Richardson.

Radii.—Br. 5 ; D. 14|14 ; A. 12 ; C. 13 ; P. 11 ; V. 1|2, spec.

(Pisces, Pl. I. fig. 1, 2.)

This fish has the fins of a *Synanceia* with the lateral eyes and head of a *Scorpena*, but instead of the ridges of the cranium, face and gill-covers ending in spinous points, they produce only obtuse knobs. Its teeth in character and position resemble those of *Pterois*, and its dermal spine-like scales are similar to those of *Centridermichthys* (Zool. of Voy. of Sulphur, p. 73). I am not quite sure that it corresponds in all its general characters with the *Aploactis aspera* of the 'Fauna Japonica' (pl. 22), but it comes sufficiently near to be included in the same generic group.

The form of the fish is rather elongated, the height of the body, which is a little less than the length of the head, being nearly one-fourth of the total length of the fish, caudal included. The compression of the head is moderate, its thickness being only one-third less than its height, and equal to about half its length. The mouth is terminal, cleft only a very short way backwards, but having a moderately large gape. The intermaxillaries are slightly protractile, and their edges and those of the mandible are covered with very short and minute, densely crowded teeth. The chevron of the vomer is similarly armed, but there are no teeth on the very narrow edges of the palate-bones, and the tongue, which is not in the least free at the tip, appears to be quite smooth. The premaxillaries are but slightly protractile, the tips of their pedicles when retracted not reaching half-way to the eye. The maxillaries have a protuberance in the centre of their lower dilated ends, and only their more slender upper halves glide under the preorbital. When the head is viewed in front, two short parallel ridges are seen covering the pedicles of the premaxillaries, above which, on the forehead, there is a deep oblong depression bounded by an elevated bony ridge, from which a side ridge formed by the prefrontals proceeds to each orbit. The margins of the orbits themselves are elevated and uneven, and there is a prominent bend upwards on the edge of each postfrontal bone ; the rest of the top of the head is occupied by the front rays of the dorsal fin. The preorbital sends one obtuse ridge forwards over the middle of the maxillary, and another and a larger one backwards in the situation of the spine of an *Apistes* ; this one is knobbed at the end and curved upwards. The suborbital chain is elevated and very uneven throughout, particularly the ridge which traverses the cheek to the hollow of the preoperculum. There is a blunt process from the angle of the latter bone, representing the spine common in this family, and three smaller knobs below it, the edge of the bone being also raised in a slighter degree. Two slightly diverging ridges, ending bluntly, cross the operculum ; there is a small blunt point on the interoperculum, and four obtuse eminences between the eye and shoulder, representing the two ridges shown in that part in the *Scorpena*. The parts between the bony eminences on the head are covered with small spines like those of the body, and the whole, in the recent state, seems to have

been enveloped in soft skin, which in the dried specimen has left traces of a short skinny fringe on the lower jaw and of filamentous points elsewhere. There are several open pores on the limbs of the mandible. The gill-membrane is smooth and is sustained by five curved rays. The gill-openings are closed above the gill-plate, but extend from the point of the operculum downwards and forwards to opposite the articulation of the mandible, being sufficiently ample.

The whole skin of the body and the lower parts of all the fins are studded with straight acute spines, each enveloped in a skinny sheath. The lateral line is nearly straight, having merely a slight rise over the pectoral. It is marked by a smooth furrow and a series of ten or twelve skinny processes.

The dorsal extends from between the eyes the whole length of the back, but is not actually connected to the caudal fin. It is highest anteriorly, lowest over the pectoral, and of medium height and nearly even posteriorly, its end being rounded off. The second spine, which stands over the middle of the orbit, is the tallest, its height being but a little less than that of the head; the first and third rays are only a little shorter, while the fifth and sixth are much lower, producing a deep notch in the fin. The eighth and following spines are very slightly graduated, and from thence to its rounded extremity the outline of the fin is even. The membrane is notched between the rays, and the tips of the jointed rays curve backwards. The first seven or eight spines are pungent, but the six following ones are less so, and are not easily distinguishable in the dried specimen from articulated rays in which the joints have become obsolete. The fore-part of the dorsal shows some small membranous points on the spines. The anal is similar to the soft dorsal, but terminates further from the caudal, and if it be furnished with a spine it is concealed at the base of the first soft ray, there being no appearance of one externally. The caudal when fully spread is almost circular in outline. Its rays are simple, with the tips projecting beyond the membrane, especially those of the extreme pairs above and below. The pectoral has the oblique semi-oval form of that fin in *Synanceia*, but is less adnate to the side. Its rays are simple, with projecting tips. The ventrals, formed of one spine and two unbranched rays, stand exactly under the base of the lowest pectoral rays, and are small.

The only vestiges of colour remaining in the dried specimen are brown and purple bands and blotches on the dorsal, caudal and pectorals, with one or two rows of white spots on the two latter fins.

CHEILODACTYLUS CARPONEMUS, Cuv. et Val. v. p. 362. pl. 128.

Radii.—Br. 6; D. 17|31; A. 3|19; C. 14½; P. 8 et VII.; V. 1½, spec.

This fish is the "Chettong," No. 39, of Neill's drawings, and the "Jew-fish" of the sealers who frequent King George's Sound. Mr. Neill informs us that it is an inhabitant of rocky shores, and that individuals are often taken which weigh more than 16 lbs. It is readily captured by the hook.

The specimen described and figured in the 'Histoire des Poissons'

was obtained by Messrs. Quoy and Gaimard in the same locality with Mr. Neill's, and the latter accords perfectly with it; but I am persuaded that the references in that work referring to Solander and Forster's accounts of a New Zealand species ought to be struck out. Some notices of the discrepancies between the memoranda of these authors and the history of *Ch. carponemus* in the 'Histoire des Poissons' have been given in the 'Zoological Transactions,' vol. ii. p. 101, and since the date of that publication the examination of various Australian specimens has strengthened the reasons I had for coming to that conclusion.

The *Cheilodactyli* do not accord well with the typical *Sciænidae*, and the evidences of the ptenoid structure of their scales are often deficient, the teeth on the disks becoming perfectly obsolete, and none existing on the margins of the scales of any species we have examined. In Mr. Neill's specimen the length of the head is contained four and a half times in the total length of the fish, in which the caudal is included. The height of the preorbital equals the diameter of the orbit; and its length is considerably greater, being about equal to one-third of the length of the head. The teeth on the jaws are needle-shaped, small, and arranged in a narrow, not crowded band. The vomer is smooth. The dorsal fin is low, the sixth and tallest spine being only equal to a quarter of the height of the body, and the fifth and seventh spines are scarcely shorter. The spines lower a little towards the soft rays, but there is no decided notch. None of the spines are stout. The second anal spine is as long as the third one and is thicker. The tenth or long pectoral ray reaches beyond the first third of the anal; the caudal is deeply forked. The transverse diameter of the scales generally exceeds the longitudinal one.

Mr. Neill's drawing represents five yellowish lines on each side of the face, reaching backwards to the occiput, the three lower ones crossing the upper part of the preorbital and being interrupted by the eye. The under and fore edge of the preorbital is marked by a blue line, which is prolonged to the temples, and there is also a short blue streak immediately under the orbit, the iris itself being likewise of that colour. Two blue lines traverse the summit of the back close to the dorsal, disappearing under the middle of the soft portion of that fin. The same colour exists on the membrane joining the first three dorsal spines, on the spines of the anal, the ventrals, the long pectoral ray, and the upper and under edges of the caudal, the tint in all these cases being a pure indigo. The rest of the fins are of a paler colour, approaching to mountain-blue.

CHEILODACTYLUS MACROPTERUS, Forster.

Sciænoides abdominalis, Solander MSS. *Pisces Australiae*, p. 11.

Sciæna abdominalis, *Idem*, *op. citat.* p. 29; *fig. pict. Parkins.* 2-40.

Sciæna macroptera, Forster, *Descrip. Anim.* p. 136. *fig. 206.*

Georgio Forst. picta.

Radii.—Br. 6; D. 17|26; A. 3|14; C. 17; P. 15; V. 1|5, Soland.

Br. 6; D. 17|26; A. 3|14; C. 30; P. 9 et VI.; V. 1|5, Forst.

Of this species I have seen no example, and it is known to me only by the descriptions and figures above referred to. It inhabits the bays of the middle island of New Zealand, and was taken on Cook's first and second voyage in Queen Charlotte's Sound and Dusky Bay. At the latter place its native appellation was ascertained to be "Taraghee," but the seamen called it "Cole-fish." That it is different from the *Ch. carponemus* of the 'Histoire des Poissons' I am inclined to believe, from the dissimilarity of the figure in the latter work with those drawn by Parkinson and George Forster, and from the more notched dorsal and stouter dorsal and anal spines than we find in authentic specimens of *Ch. carponemus* from King George's Sound. These discrepancies, and the smaller number of dorsal and anal rays, authorise us to keep it distinct until an opportunity occurs of examining the New Zealand fish. The broad black band which descends from the shoulder not quite as far as the pectoral is a good distinctive mark. The reader is referred to the 'Zoological Transactions,' vol. iii. p. 101, for extracts from Solander's notes, which may be compared with Forster's description in the 'Historia Animalium,' &c. p. 136.

Some specimens of *Cheilodactyli* from Sydney which I have seen point at a species nearly allied to the two preceding ones as existing in that part of Australia, but the materials I possess are not sufficient for the elaboration of its distinctive characters.

CHEILODACTYLUS NIGRICANS, Richardson.

Radii.—Br. — ; D. 15|26 ; A. 3|10 ; C. 15 $\frac{3}{5}$; P. 9 et V. ; V. 1|5, spec.

Toorjenung, Neill's drawings, No. 42.

This fish is the "Toorjenung" of the natives of King George's Sound, and the "Black Jew-fish" of the sealers. Mr. Neill says that it grows to a large size, feeds grossly, and that its flesh is dry and dark-coloured. It is much prized by the aborigines, and forms a principal article of food among the native families, who are expert in spearing fish. The head of a large fish is said to make good soup. It is an inhabitant of rocky points that project from sandy bays, and moves sluggishly along the bottom, ploughing the sand with its soft fleshy lips; hence it falls a ready sacrifice to the native spear.

In shape this fish approaches to *carponemus*, but is rather more elongated in the body, and has a more arched spinous dorsal. Its eye is more remote from the gill-opening, being nearer to the middle of the head, and the preorbital is shorter, its length not exceeding the diameter of the orbit. The most striking dissimilarity to the preceding species is in the longest pectoral ray, which projects only about one-sixth of its length beyond the membrane. It is the uppermost of the simple rays, and the four others are graduated and also project beyond the membrane as far in proportion. The disk of the preoperculum is broad, that of the interoperculum fully equal to it, and both these bones and the cheek are scaleless in the specimen, which has sustained some damage in the head, but not apparently in these places. *Ch. carponemus* and *aspersus* have interopercular bones rather narrower than the disk of the preorbital, and both these

bones, with the cheek, are covered with small scales which do not extend to the preorbital. In *aspersus* a small part of the cheek next the preorbital is scaleless. In all these species the operculum and suboperculum are densely scaly. The integuments of the cheek of *nigricans* are full of pores, and the lips are large and fleshy. About forty-eight scales occur in a row between the gill-opening and caudal, with three or four rows in addition on the base of that fin. About seventeen compose a vertical row at the shoulder. The scales of the lateral line arc, as in the other species, smaller than those above and below, which also overlap them. The exposed disk of a scale is rough, with minute points, but the exterior margin is thin and membranous. The base is faintly marked by a dozen or more slightly divergent furrows, which do not produce marginal crenatures. The sixth and tallest dorsal spine equals one-third of the height of the body and is higher than the soft rays, which rise considerably above the posterior spines. The third anal spine is more slender and considerably longer than the second one. None of them are strong. The caudal is forked to half its depth, and has acute lobes.

In Mr. Neill's drawing this fish is represented as having a dark greyish-black colour on the back, head and fins, and as being pale on the belly. The lips are flesh-coloured. Length of the specimen 21 inches. The drawing is two feet long.

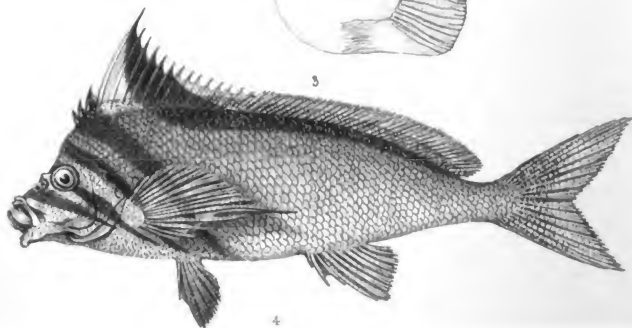
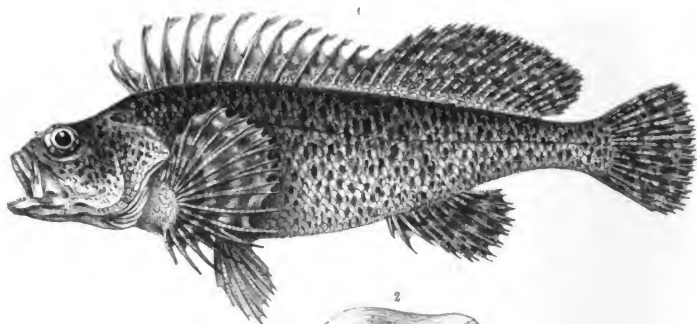
CHEILODACTYLUS ASPERSUS, Richardson.

Cheilodactylus carponemus, Richardson, *Zool. Trans.* vol. iii. p. 99, *exclus. synonym.*

Radii.—Br. 6; D. 17|27; A. 3|11; C. 13½; P. 8 et VII.; A. 1|5, specimens.

This fish frequents Port Arthur in Van Diemen's Land, and Dr. Lhotzky says that it is never taken at Sydney. In the 'Zoological Transactions' for 1841 (vol. iii. p. 99) there is a notice of it, to which the reader is referred; but it is necessary to state that the number of fin rays there given are those of *Ch. carponemus*, as expressed in the 'Histoire des Poissons.' I there pointed out some of the discrepancies between the examples of this fish I had then before me and the description and figure of *carponemus* in the work just referred to; but being at that time very imperfectly aware of the number and variety of the *Cheilodactyli* existing in the Australian seas, I did not venture to indicate it as a proper species. This I am now enabled to do, after a careful comparison of the specimens then commented upon with Mr. Neill's example of *carponemus* from King George's Sound, the exact locality of the specimen of the latter described by Cuvier and Valenciennes.

Ch. aspersus is a higher fish than *carponemus*, the greatest height of the body being contained only three times and one-third in the total length, caudal included. It is much compressed, with an acute back and a deeply-forked caudal. The more arched form of the spinous part of the dorsal fin, and the much stouter dorsal and anal spines, afford a ready means of distinguishing the dried specimens. The different colours and markings of the recent fish are very appa-



W. M. C. C. C. C. C. C.

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1 & TREPETERIUS MACULOSUS.
3 & CHEILODACTYLUS GIBBOSUS

rent. The first and last dorsal spines are much shorter than the corresponding ones of *carponemus*, and the notch of the fin is conspicuous from the greater height of the soft rays. The second anal spine is very stout, and it rather exceeds the third one in length. The preorbital is smaller than in that species, and its length does not exceed the diameter of the orbit. The face is therefore shorter, and the profile rises more steeply to the dorsal, owing to the greater height of the fish. The elongated pectoral ray, which is the tenth, reaches no farther back than the beginning of the anal. The scales are rather large and much tiled. About fifty-two exist on the lateral line, besides six or seven rows on the base of the caudal, and there are twenty-two rows in the height of the fish.

Mr. Lempriere, from whom we had the specimens, says that the fish is known at Port Arthur under the name of "the Perch," and has a bright silvery hue with dark spots. The specimens still exhibit many dark brown spots scattered thickly on the back and more sparingly on the sides, most of them being rather smaller than the exposed disk of a scale. The vertical fins, particularly the caudal, are more minutely spotted. The top of the gill-cover is blackish, and there is a dark mark on the humeral bone. As is usual in the genus, the inside of the mouth and lining of the gill-opening are purplish-black. Length $12\frac{1}{4}$ inches. Greatest height $3\frac{3}{4}$ inches.

The *Cheilodactylus carmichaelis* (Hist. des Poiss. v. 360) (*Chaetodon monodactylus*, Carmichael, Linn. Trans. vol. xii. p. 500. pl. 24) approaches *aspersus* in shape, in the length of its long pectoral rays, and in the number of fin rays generally, but it is distinguished by six short, broad dark bars on the back. The formula of its rays is as follows:—*Radii*.—Br. 6; D. $17\frac{1}{2}$; A. $3\frac{1}{2}$; P. 9 et VI.; V. $1\frac{1}{5}$, Carmichael.

The *Cheilodactylus fasciatus* (Cuv. et Val. v. 357) of the Cape is distinguished by four or five vertical dark bands and five transverse lines on each lobe of the caudal. Its rays are stated to be:—

Radii.—Br. 5; D. $19\frac{1}{2}$; A. $3\frac{1}{2}$; C. 17; P. 10 et V.; V. $1\frac{1}{5}$. Hist. des Poiss.

CHEILODACTYLUS GIBBOSUS, Solander. (*Chaetodon*.)

Chaetodon gibbosus, Banks, Icon. Parkins. ined. t. 23.

Cheilodactylus gibbosus, Richardson, Zool. Trans. vol. iii. p. 102.

Radii.—D. $17\frac{1}{2}$; A. $3\frac{1}{2}$; C. $14\frac{1}{4}$; P. 8 et VI.; V. $1\frac{1}{5}$, spec.

(Pisces, Pl. II. fig. 3, 4.)

This fish inhabits the seas of Van Diemen's Land and the east coast of New Holland, as well as King George's Sound. A full description of it is contained in the 'Zoological Transactions' quoted above. It has the highest spinous dorsal of any described species of *Cheilodactylus*, and in the distribution of its black bands it bears a considerable resemblance to *Eques americanus*.

Mr. Neill gives a drawing of it (No. 24), and states that it is known to the aborigines of King George's Sound by the name of No. CCV.—PROCEEDINGS OF THE ZOOLOGICAL SOCIETY.

"Knelvek." The natives spear it on sandy banks, but say that it is rare. Its scales are smooth, and the second and third anal spines are moderately long and equal to each other. The suboperculum is narrow, and together with the other opercular bones and cheek is scaly.

The figure is one-third of the size of the specimen. The scale is magnified. A considerable part of its disk retains the small asperities or ptenoid teeth, which do not however extend to the margin of the scale, that being, as is usual in the genus, thin and membranous.

CHEILODACTYLUS NIGRIPES, Richardson.

Radii.—Br. 6; D. 18|26; A. 3|10; C. 13 $\frac{2}{5}$; P. 7 et V.; V. 1|5, spec.

The aborigines of King George's Sound had no name for this species, and no drawing of it was made by Mr. Neill. The only specimen of it obtained was speared by a native named Murrianne, and measures 13 inches in length. It has a conical eminence on the prefrontal bone, like that existing in *Ch. gibbosus*; its face is short, with the profile ascending almost as much as in the species just named. The length of the preorbital is rather less than the diameter of the orbit, the eye is placed midway between the gill-opening and mouth, and the interoperculum is only about half as wide as the disk of the preoperculum. The cheek and all the pieces of the gill-cover are densely scaly. The second of the simple pectoral rays is the longest and it falls short of the anus, while only about one-third of its length projects beyond the membrane. The spinous part of the dorsal is arched anteriorly. Its fifth and longest spine rather exceeds one-third of the height of the body. The preceding ones are graduated to the first, whose height is only a fifth part of the fifth one, but the decrease of the posterior spines is much less rapid, the last one having half the length of the fifth. The soft rays rise to nearly twice the height of the posterior spines, rendering the fin notched. The third anal spine is somewhat longer than the second one, which is stouter, but the spines generally are of moderate thickness, and are compressed. The caudal is forked to half its depth. The ventral spine is long and slender. The scales are without asperities, and the exposed part of their disk exhibits the concentric rings of structure distinctly. About sixty-one exist in a row between the gill-opening and caudal, exclusive of three or four on that fin. The teeth on the jaws are slender and closely set.

In the dried specimen the ventrals are pitch-black, and the other fins are nearly equally dark. The body is also dark, but in the absence of drawings or descriptions of the recent fish we cannot state its proper tints.

CHEILODACTYLUS ZONATUS, Cuv. et Val.

Cheilodactylus zonatus, Cuv. et Val. vol. v. p. 365; *Rich. Rep. Brit. Assoc.* 1845, p. 239.

Radii.—D. 17|31; A. 3|8; C. 14 $\frac{5}{8}$; P. 8 et VI. spec.

This fish, which is common to the China and Australian seas, appears to be called the "Zebra-fish" by the sealers who frequent

King George's Sound, though that name is most generally appropriated by them to the *Crenidens zebra*. Its prefrontal bone projects behind the nostril, but not so acutely as in *Ch. nigripes* or *gibbosus*. There is however a difference in this respect in different individuals. The width of the interoperculum is about half that of the preopercular disk, and these bones and the cheek are densely scaly. The scales of the cheek however are imbedded in spongy porous skin. The length of the preorbital equals the diameter of the orbit. In the relative sizes of the opercular bones and preorbital, and in the form of the dorsal, *zonatus* and *nigripes* closely resemble each other, but there is a difference in the anal spines, in the rays of the pectoral, in the shape of the caudals, that of *zonatus* being only sparingly excavated, and a striking one in the colours.

The dried specimen of *zonatus* shows very distinctly eight dark oblique bars on the body, the first crossing the nape and the last the base of the caudal, the intermediate pale spaces being equal to the bars in breadth. The entire head, including the preorbital, is thickly marked by round dark spots of the size of duck shot. There are large spots on the caudal, which are so crowded on the margin of the fin as almost to form a continuous bar. Two or in some parts more rows traverse the dorsal, and there are dark marks on the tips of the anal and ventrals. The simple rays of the pectoral are orange. Mr. Reeves's drawing of the Chinese fish represents it as dressed in very lively colours during the breeding season.

The dorsal is highest at the fifth spine, as in *zonatus*, and is in other respects similar in form; but the anal spines are shorter, especially the second, which is also stouter in proportion. Rather less than one-third of the longest pectoral ray projects beyond the membrane, and the membrane is less deeply notched between the other simple rays than in *nigripes*. The scales differ from those of the last-named species, being finely granulated on the disk, as in *nigricans*.

The rays are somewhat differently enumerated in the 'Histoire des Poissons,' from a Japanese specimen. *Radii*.—Br. 6; D. 17|29; A. 3|8; P. 9 et V.; V. 1|5, Cuv. et Valenc.

The *Cheilodactylus brachydactylus* (Hist. des Poiss. p. 361) of the Cape approaches more nearly to our examples of *zonatus* in the numbers of the rays, but it does not appear to possess the prefrontal prominence, and has no other markings than a triangular black mark behind the eye. *Radii*.—Br. 5; D. 17|31; A. 3|9; C. 17; P. 8 et V.; V. 1|5, Cuv. et Valenc.

Cheilodactylus ciliaris, Richardson, Zool. of the Voy. of the Erebus and Terror, p. 37. pl. 26. fig. 6, 7 (*Latris*; *Sciæna ciliaris*, Forster, &c.), is a species which is allied to the following ones, in the shortness of its simple pectoral rays.

CHEILODACTYLUS HECATEIUS, Richardson.

Latris hecateia, Richardson, Zool. Trans. p. 106. tab. 6. f. 1.

Radii.—Br. 6; D. 18|36; A. 3|27; C. 16 $\frac{2}{3}$; P. 9 et IX.; V. 1|5, spec.

In the account of this species quoted above, I expressed doubts of the rank of *Latris* as a subdivision of the *Cheilodactyli*; but now that I have had an opportunity of examining a more complete gradation of specific forms, I am not disposed to think that it merits to be considered even a subgenus, though the non-prolongation of one of the pectoral rays (usually the tenth) makes it a convenient division of the *Cheilodactyli*, now known to be numerous.

This species inhabits the seas of Van Diemen's Land.

CHEILODACTYLUS LINEATUS, Forster (*Sciæna*).

Cichla lineata, *Schneider*.

Sciæna lineata, *T. R. Forsteri Descr. Anim.* p. 134. An. 1844; *Fig. pict. Georg. Forsteri in Bibl. Banks. servata*.

Radii.—Br. 6; D. 18|36; A. 1|26; C. 30; P. 17; V. 1|5, Forst. *l.c.*

This species agrees nearly with the preceding in the numbers of its fin rays, except that Forster says expressly that it has only one anal spine. It has also four dark dorsal stripes, with three intervening silvery ones; but it differs from *hecateius* in the yellowish colour of its fins, and particularly of its caudal, which obtained for it the appellation of "Yellow-tail" from the sailors. It frequents, like the other *Cheilodactyli*, rocky places, was captured by Cook's sailors with the hook, and was much approved as an article of food. It is a native of the seas washing the southern island of New Zealand. Length of specimen described by Forster, 24 inches.

Having seen no specimens we cannot institute a correct comparison with *hecateius*.

THREPTERIUS, Richardson.

(Θρεπτήριος, *ad alendum idoneus*.)

Genus piscium acanthopterygiorum *Cheilodactylis* affine. Corpus catheto-platum, ovato-oblongum, squamosum. Caput aliquantulum parvum, cute porosâ tectum, absque spinis, angulis vel aciebus serratis osseis. Os ut in *Cheilodactylis* extensibile. Dentes in premaxillaribus, mandibulâ trigonioque vomeris unâ serie instructi, brevissimi, parvi, subconici. Ossa palatis lævia. Genæ craniumque esquamosæ. Os preorbitale angustum. Operculum subtriangulare squamis tectum. Membrana branchiostega radiis sex curvis, satis validis sustentata. Squamæ læves nec dentatæ; linea lateralis recta. Radii pinnarum pectoralium inferiores simplices. Pinna dorsi e nuchâ ferè usque ad caudæ pinnam regnans, squamulis apud radios instructa, membranâ inter spinas profundè emarginatâ; lobulo tamen membranaceo e summis spinis pendente. Pinnæ ventrales thoracicæ sed a gulâ paulo remotæ.

The characters are deduced from dried specimens, and the pharyngeal teeth and structure of the intestinal canal are unknown. The jaw teeth are not strictly disposed in a single row, since a few minute ones form a row behind the others in front of the premaxillaries; but these can scarcely be visible in the recent fish. The chevron of

the vomer is acute and projects a little. The orifice of the mouth is rather larger than in the *Cheilodactyli*, but the jaws are extensible in about the same degree. The maxillary bone wants the flat thin plate near its head which exists in the *Cheilodactyli* and glides beneath the preorbital. The latter bone is narrow, its width not being equal to one-third of the diameter of the orbit. The eye is comparatively large, three diameters and a half of the orbit being equal to the entire length of the head, and two of these diameters measure the distance between the hinder edge of the orbit and the tip of the gill-cover. The position of the eye is high enough to encroach upon the profile. The cheek equals the diameter of the orbit in breadth; the disk of the preoperculum is also wide, and the interoperculum moderately so. The operculum and suboperculum conjointly have a triangular form; the former is notched, and the latter is prolonged by a membranous tip, which forms the apex of the gill-cover. Both these bones are densely scaly; there is also a row of scales on the interoperculum, partially overlaid by the thin edge of the preoperculum, and the temples are also scaly. The rest of the head is without scales, but the mucous skin, full of canals and pores, which envelopes the head, prevents us from ascertaining the exact extent of the scales, at least in the dried specimens. The top of the head is destitute of scales to the occiput, but in the *Cheilodactyli*, dense, small scales extend forward on the skull to before the eyes. In the absence of thick fleshy lips, the genus differs from *Cheilodactylus*. The preorbital is neither wide enough nor long enough to conceal the maxillary, which however enters partially beneath its edge. The thin crescentic border of the preoperculum is striated, but not crenated. The same kind of streaks or furrows may be discerned, though not so readily, in some *Cheilodactyli*. The head forms a fourth of the total length. The height of the body is also equal to a fourth of the length of the fish, caudal included. The belly is prominent, and the tail, posterior to the vertical fins, is slender. The lateral line is straight, and each of its scales is marked by a short straight tube, which is placed somewhat obliquely to the general direction of the line. About fifty-two scales compose a row between the gill-opening and caudal, the base of whose rays are also scaly, and the lateral line is prolonged as far as the scales extend on that fin.

The dorsal commences over the upper angle of the gill-opening and reaches to within an inch of the caudal. Its seventh spine, which is the tallest, is nearly equal to half the height of the body; the others are graduated very slightly posteriorly and more rapidly anteriorly. None of them are stout, and all of them are traversed on each side by a deep furrow. The membrane between them is deeply notched, as in the genus *Pelors*, and a slender process running up the back of each spine surmounts it in form of a small free lobe. The soft rays surpass the tallest spine a little, and are more than twice the height of the last one. The anal commences opposite to the beginning of the soft portion of the dorsal and ends beneath its tenth branched ray, or, in the specimens before us, about two inches and a half from the caudal. The spines are like the dorsal ones, grooved and slender,

and the second one, which is scarcely shorter than the third, is not quite twice as long as the first one. The seven inferior simple rays of the pectoral have free tips, their membrane being deeply notched as in the dorsal. The ventrals are attached under the middle of the pectorals, or opposite to the sixth dorsal spine. Their spine is slender, and about two-thirds of the length of the soft rays. The caudal is rounded, with the tips of the rays projecting beyond the membrane.

THREPTERIUS MACULOSUS, Richardson.

(Pisces, Pl. II. fig. 1, 2.)

This fish approaches the division *Latris* of the *Cheilodactyli* in the form of its pectoral fin and other characters, but differs so much in its general aspect, which reminds one of a cottoid fish, that it is well that we can find a structural difference which enables us to place it in a separate genus. This exists in the vomerine teeth, the vomer being smooth in the *Cheilodactyli*, but in this fish it is armed like the jaws by a single row of teeth, which, instead of being setiform and crowded, as in the *Cheilodactyli*, are short, somewhat conical, and confined nearly to a single row on the jaws as well as on the vomer.

The native name of the fish at King George's Sound is "Cümbeük," and it frequents rocky places, having apparently the same habits with the *Cheilodactyli*. The simple projecting rays of the pectoral would appear to perform the functions of an organ of touch, and are furnished to many fish that, like the *Trigla*, swim close to the sandy bottom, which they touch with these simple rays, whether they are wholly or partially free. The Cümbeük is prized as an article of food, whence the generic name.

Mr. Neill's figure represents the fish as having a pale brown colour, much lighter on the belly, and thickly studded with irregular dark liver-brown spots, most crowded along the back and becoming much smaller and more scattered on the belly. The fins are rather of a redder brown, and the soft dorsal, ventral and caudal are minutely spotted. Length 9 inches.

TAUTOGA PARILA, Richardson.

Paril and "Common Rock-fish," *Neill's drawings*, No. 9; *Richardson, Ichth. Erebus and Terror*, p. 127, *sub* Labro fucicolâ.

Radii.—Br. 6; D. 9|11; A. 3|10; C. 134; P. 13; V. 1|5, specimens.

This species of *Labrus* or *Tautoga* approaches *Labrus tetricus* (Ichth. of Erebus and Terror, pl. 55. f. 1) in general form, but there is only a single row of scales on the temples, and they do not descend lower than the middle of the upper limb of the preoperculum. The scales covering the operculum and suboperculum are, as in the allied species, large. The cheek, preoperculum and the broad thin interoperculum show no scales, but, in common with the top of the head, are covered with a thick skin full of mucous canals and open pores. The diameter of the orbit is less than the length of the preorbital,

and is contained five times and a half in the length of the head when the jaws are retracted. The preorbital lips are only slightly developed, but the intermaxillary and mandibular ones are thick and plaited. Teeth arranged in each jaw in a series gradually decreasing towards the angle of the mouth, the anterior pair above and below being considerably larger and more curved. In the upper jaw there is a complete interior series of small rounded teeth which are on a level with the soft parts. On the mandible the interior row is confined to the fore-part of the jaw, and is less regular. The tubular ramifications on the scales of the lateral line are more numerous and crowded than in *L. tetricus*, or any of the other Australian species figured in the 'Ichthyology of the Erebus and Terror.' There are twenty-four scales on the lateral line having these clusters of tubes, and the clusters do not diminish in size towards the tail, though one or two less bushy occur under the soft dorsal. The line is as usual suddenly bent downwards under the end of that fin.

In the dried skins dark brown lines radiate from the orbit over the temples, cheek, and preorbital, and there are dark spots on the jaws, top of the head and gill-plates. There are also some white blotches and bars on the cheek, preoperculum, interoperculum and lower jaw. The body is variegated with brown spots, crowded along the back, more scattered on the sides, and mixed with small round dots of the same tint. The dark marks extend to all the vertical fins. These spots have an umber-brown colour in Mr. Neill's drawing.

No. 37 of the same drawings represents the "Black-fish of the sealers" and the "Paril" or "Knhoul" of the natives, which is considered to be a variety of the preceding. There is no specimen of it in the collection, but it has the back and upper part of the sides thickly sprinkled with reddish-brown dots without any larger spots. This variety or species is said to grow to the size of 15 or 20 lbs.

COSSYPHUS VULPINUS, Richardson.

Radii.—Br. 4; D. 12|11; A. 3|12; C. 14 $\frac{2}{3}$; P. 16; V. 1|5, spec.

The height of the body is one-fourth of the total length of the fish, caudal included, and is about equal to the length of the head.

The profile rises in a slightly concave line from the acute snout to opposite the back part of the orbit at an angle of 30°. From thence to the beginning of the dorsal, which stands as far back as the axil of the ventrals, the line is almost horizontal, and judging from the dried specimen the dorsal ridge there is acute. When the jaws are protracted the face has a hollow profile, and the strong series of teeth give it a sinister look. There are two pairs of canines at the extremities of the upper and under jaws, the upper ones being inclined forwards, and also a canine at the corner of the mouth, which is bent outwards. The smaller teeth are rather widely set, and there are six of them on each maxillary and fourteen on each limb of the lower jaw; and of the latter the middle ones are somewhat longer than those towards each end of the jaw. Within the front teeth on both jaws there is a flat naked surface of bone fitted for grinding or crushing, and more interiorly a few minute granular teeth scarcely protruding

from the bone. The cleft of the mouth extends backwards to the front of the preorbital bone, and is equal to the distance between the corner of the mouth and the eye.

The preorbital is covered with smooth skin, presenting an even surface in the recent fish, but in the skeleton it presents three deep notches anteriorly, separated by linear processes. The rest of the suborbital chain is narrow. The upper limb of the preoperculum is finely serrated, the serratures disappearing on the rounded angle. The disk of that bone, the other opercular pieces, the cheeks, temples and suprascapulars are scaly, but there are no scales on the limbs of the lower jaw, in which respect the species differs from the *Cossyphus maldat* of the 'Histoire des Poissons,' to which it has some resemblance in general form. There are six rows of scales on the cheek and as many on the interoperculum; the scales on the disk of the preoperculum are smaller than these, and those covering the operculum and suboperculum are considerably larger. The naked part of the scales exhibits little pits rather than granulations. There are thirty scales on the lateral line, each carrying a simple tube with its point turned upwards. The tube is more branched in *C. maldat*. There is no sudden bend in the lateral line, but it descends gradually under the soft dorsal rays to the middle height of the tail, on which there are eight rows of scales.

The anal and dorsal fins move in scaly sheaths, which are broadest on the soft rays. The spinous rays are strong, tapering, and acute. The first dorsal spine stands over the axil of the ventrals; and the ventral spine, which is as tall as the last and longest dorsal one, stands beneath the base of the lowest pectoral ray. The soft parts of the anal and dorsal are somewhat peaked, and rise above the spines. These two fins end exactly opposite to each other, and leave a considerable space of naked tail behind them. The angles of the caudal project a little beyond the straight intermediate border. The colours of the specimen have faded. Length 16 inches.

COSSYPHUS GOULDII, Richardson.

Labrus gouldii, *Rich. Ann. & Mag. Nat. Hist.* xi. p. 353.

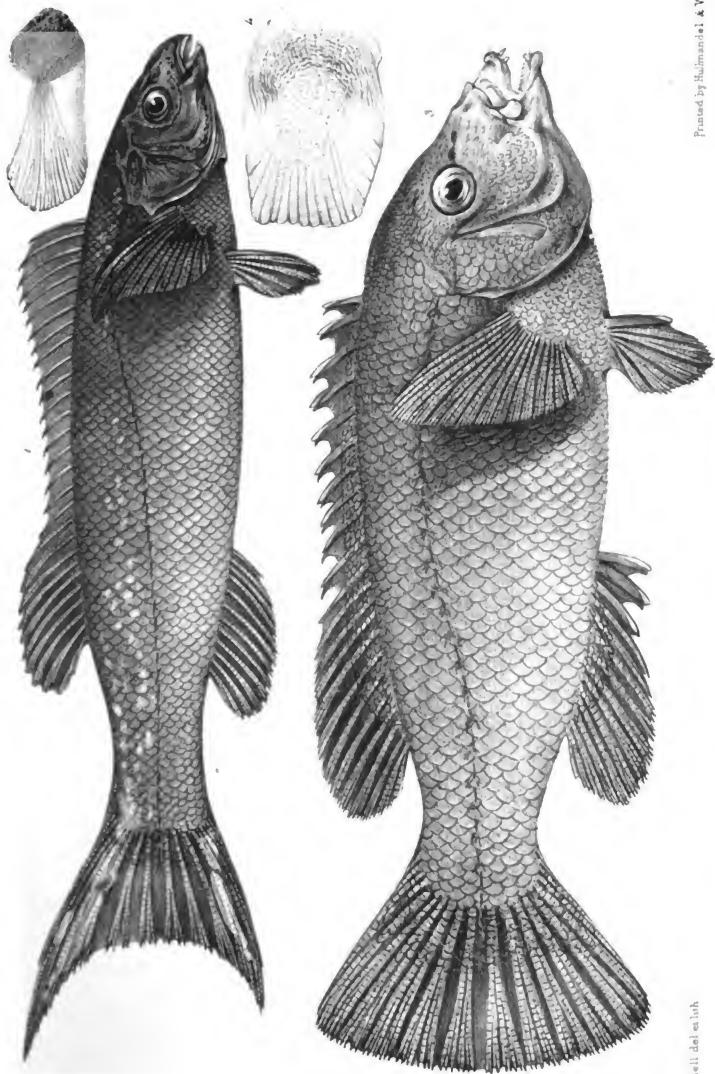
Cossyphus, vel *Lachnolaimus gouldii*, *Idem*, *Ichth. of Voy. of Erebus and Terror*, p. 132.

Radii.—D. 11|10 vel 11; A. 3|10 vel 11; C. 14 $\frac{3}{4}$; P. 17 vel 16; V. 1|5, spec.

(Pisces, Pl. III. fig. 3, 4.)

Mr. Neill's collection contains a young specimen of this fish, which was previously known to me only by an example of considerably greater size, brought from Western Australia by Mr. Gould. Neither specimen retained the pharyngeal bones, and I still remain in doubt as to which of the dismemberments of the Linnæan genus *Labrus* it ought to be referred.

It has the general form of *Labrus*, with the scaly dorsal and anal sheaths of *Cossyphus*, and a peculiarity in the very compressed form of the spinous rays which I have not as yet seen in any other *Labroid*. It has the four anterior canines in each jaw which exist in



some *Cossyphi*, and on the mandibles these canines are inclined forward like the corresponding teeth in *Anampses*. There are no canines at the angle of the mouth. The lateral teeth are incorporated with the bone, and are small and uniform, not decreasing in succession, as in the *Labri*. In the young specimen the bone of both jaws is thin, and the forms of the lateral teeth are distinctly seen, cemented laterally to each other, with a few very minute granular teeth scattered on the interior surface of the bones; but in the older specimen the premaxillaries have swollen behind the canines and acquired a smooth surface by friction, and the edges of the jaws having worn down the forms of the teeth composing them, are obscured—their rounded points alone being visible. On the other hand the granular teeth on the sides of the jaws have become more conspicuous in consequence of their growth.

The cleft of the mouth is small, not exceeding the diameter of the eye. The length of the preorbital is greater. The latter bone and the suborbital chain, with the lower jaw and top of the head, are scaleless. The edge of the preoperculum is quite smooth, and its disk appears to be scaleless, but there are nine rows of small scales on the cheek, and the other gill-pieces are scaly, those on the operculum and suboperculum being larger than the rest. The uncovered disks of the scales of the body are rough, with small round points, the edges being thin, membranous, and striated or wrinkled. The descending curve of the lateral line under the soft dorsal is the gradual one of a *Cossyphus*, not the more sudden deflection of a *Labrus*. Each of the scales composing it has a loose arbuscle of sparingly branched tubes.

The dorsal spines are strong and comparatively short, and the anterior ones are compressed so as to render their front edges acute. The compression diminishes in the posterior spines, and the last and tallest one is subulate, grooved and pointed. The foremost two anal spines are even more conspicuously compressed, and the third one is subulate. The ventrals are rounded, and have a compressed spine which stands under the second and third dorsal spines and base of the pectoral—being farther forward than in *Cossyphus vulpinus*.

This fish is represented as having a dark purplish colour, and is said by Mr. Neill to bear the names of "Koojenuck," "Quejuinuck," or "Knowl," among the aborigines of King George's Sound. It attains the weight of 28 or 30 lbs. It is described more at length in the 'Ichthyology of the Voyage of the Erebus and Terror,' quoted above.

JULIS CYANOGRAMMA, Richardson.

Radii.—D. 9|13; A. 3|13; C. 12 $\frac{3}{4}$; P. 13; V. 1|5, spec.

This species is the "Knelmick" or "Kielnmick" of the aborigines frequenting King George's Sound, and the "Common Rock-Cod" of the sealers. It is also an inhabitant of New South Wales, specimens of it having been sent to the Museum at Haslar by Mr. Miles. Its flesh is little prized.

In the numbers of its fin rays it comes near *Julis dussumieri*, but

differs from it in having smaller scales, in form and in colours; nor have I been able to refer it to any described species. Its body is elongated; its height, which is not equal to the length of the head, being contained five times and a half in the total length of the fish, caudal included. The compression of the head is considerable, its thickness not exceeding half its height, and the occiput and nape are acute. The length of the preorbital is considerably greater than the diameter of the eye, and the cheek and interoperculum are both high. There are no scales on the temples or any other part of the head. There are fifty scales on the lateral line, each marked by six or seven short, simple, diverging tubes. The lateral line is bent downwards under the ninth, tenth and eleventh soft rays of the dorsal; it is otherwise straight, and runs near the back. The dorsal commences far forward, over the top of the gill-cover, and runs back with an even outline; its tip, which is acute, though not prolonged, reaching, when laid back, to the base of the caudal. Its spines, as well as those of the anal and ventrals, are flexible and very slender. The pectorals are not large, and the ventrals have tapering, acute, but not filamentous tips. They stand under the base of the lowest pectoral ray. The caudal is moderately rounded, and it is scaly between the rays for more than one-third of its length.

When the open mouth is viewed in front, its teeth form a rhomb; the front pair of teeth above and below are comparatively large and are curved. There is also a small curved tooth standing forwards from the angle of the mouth.

Mr. Neill's drawing represents this fish as having an aurora-red ground colour on the head, back, dorsal and anal fins, the fins being of the deepest tint. The head is ornamented by deep blue lines, which are distinctly visible on the dried specimen. These all form curves more or less bold, with the convexity forwards. The anterior one begins on the nose, runs forward to the lips, and inclines backwards again on the lower jaw; the next descends from the nostrils over the disk of the maxillary and posterior part of the lower jaw. Two descend from the orbit over the interoperculum, and there are some finer intermediate ones which vanish on the cheek. There are also about six slender lines on the gill-cover, which are thickened on the suprascapular region. The body is traversed by seven or eight rows of short blue lines, which on the tail are superseded in part by dots. The dorsal and anal have about three rows of these short lines, and the caudal, which is reddish-orange, is streaked longitudinally with blue. The pectoral and ventrals are flesh-coloured.

Length of specimen $12\frac{1}{2}$ inches.

OLISTHOPS, Richardson.

(*Olisthops*, ex *ὀλισθηρός*, *lubricus*, et *ὤψ*, *vultus*.)

Genus generis *Odacis* affine. Caput totum cute lubricâ, esquamosâ tectum (squamulæ quatuor tantum inconspicuis regioni suprascapulari utrinque insidentes). Labia simplicia cum cute faciei con-

tinua, labia preorbitalia nulla. Dentes cum ossibus lunatis premaxillaribus mandibulisque, modò *Scarorum* ferruminati. [Ossa pharyngea ab exemplaribus nostris excisa, hinc nobis ignota.] Squamæ cyloideæ. Linea lateralis simplex, e tubulis rectis facta, continua; anticè arcuata, posticè recta. Pinna dorsi unica, prope humerum incipiens, in parte spinosa, modo proprio, emarginata; radiis spinosis apicibus flexilibus. Pinnæ ventrales sub axillis pectoralium positæ. Membrana branchiostega in gutture continua, utrinque radiis quatuor sustentata.

The general form of this fish has been known to me for some years by the accurate drawing of Mr. Neill. It is an inhabitant of King George's Sound in Australia, where it is recognised by the natives under the name of "Toobitoet," or "Toobitooit," and it is said to inhabit rocky places and to be rarely captured. In the construction of its jaws and in general form it approaches most nearly to *Odax*, but it differs from that genus, and still more from *Scarus*, in the want of scales on the head, the single lips, and in the unusual form of the dorsal. The subjoined description is drawn up from a specimen prepared by Mr. Neill, which I have lately had an opportunity of inspecting.

In the shape of the jaws *Olisthops* resembles several species of *Odax* which inhabit the Australian seas, but does not agree altogether with the account of the dentition of that genus as given in the 'Histoire des Poissons' (xiv. p. 299), nor with the drawing of the jaws of *Odax pullus* (*op. cit.* pl. 408. f. 2).

The jaws of *Odax*, says M. Valenciennes, are composed, as in *Scarus*, of an assemblage of small teeth arranged in a quincuncial order and intimately soldered together, forming on each side a single body, whose cutting edge is crenulated; but these jaws are neither so broad nor so convex as in *Scarus*, and are entirely covered by the lips. They differ from those of *Scarus* in that the teeth form two spoon-bowls at the end of the mouth in front of the spinous points which crown the teeth of the jaw. *Olisthops* and several *Odaces* want these posterior marginal toothlets, the spoon-shaped masses constituting the entire dental process of the jaw, and showing their origin merely by the reflections of the incorporated, minute pearly quincuncial teeth, so densely crowded as to form nearly the whole of their smooth exterior surfaces.

OLISTHOPS CYANOMELAS, Richardson.

Radii.—Br. 4; D. 18|10; A. 3|10; C. 12½; V. 1|5; P. 12.

(Pl. III. fig. 1, 2.)

Form elongated, the greatest height of the body, which occurs just behind the ventrals, being contained five times and a half in the total length of the fish, caudal included. The bluntness of the head, produced by the form of the jaws, is intermediate between that of *Scarus* and *Odax*, and the profile, from the nostrils to the dorsal, is moderately ascending and but slightly convex. The jaws have the usual

structure of those of *Scarus*, being composed of a multitude of minute teeth, arranged in a quincuncial order in many rows, and so incorporated with the bone that they produce no inequality of surface, but reflect the light in certain positions so as to reveal their structure. The two premaxillaries conjointly, and the two halves of the mandible, resemble half the bowl of a spoon with straight cutting edges, which under a lens appear to be striated and minutely crenulated. At the symphysis of the mandible, the cutting edge rises slightly, so as to seem very slightly peaked. The orifice of the mouth is comparatively small, and the small maxillaries are concealed under the skin at its corners. Interiorly there is a conspicuous velum in both jaws. The small nostrils lie in a membranous space above the pre-orbital.

The entire head is covered with smooth integument, which has no inflexed folds at the edges of the opercular pieces or preorbital, but is continuous with single lips, that are capable of covering the jaws. The gill-membrane is continuous with the edges of the interopercula, and passes over the isthmus to which it is partially adherent, leaving a small flap posteriorly. It is sustained by four flat thin rays on each side. In length the head is equal to five diameters and a half of the circular orbit, and the space between the eye and the tip of the gill-flap equals three of these diameters. The eye is near, but does not touch the upper profile of the head. A triangular preorbital, having a length equal to the diameter of the orbit, is so concealed by the integument that it is scarcely discernible in the recent fish, but in the dried specimen it shows a slightly raised disk bounded in a somewhat radiated manner by slightly prominent mucous canals. The rest of the suborbital chain goes round more than half the orbit in form of a slender line of simple mucous tubes. The two limbs of the preoperculum, equal to each other in length, meet at a right angle and inclose a broad and perfectly smooth cheek. In the dried fish the disk of the bone appears raised, and is edged irregularly with mucous prominences, but the under border of the bone is thin, and is scarcely distinguishable from the very thin, flexible interoperculum. At the temporal angle of the gill-plate there originates a bushy cluster of prominent ramifications, which disappear about the middle of the disk, and are most probably not visible at all in the recent fish. The rather narrow, very thin suboperculum is lengthened into the tip of the gill-cover, in which the flexible bone is scarcely to be distinguished from the membrane. The gill-opening is restricted above, the whole upper edge of the operculum being attached to the side of the head by membrane. Posteriorly and above the pectoral the gill-membrane is vertically truncated, and the gill-opening slopes from the level of the upper ray of that fin downwards and forwards till it terminates opposite to the angle of the preoperculum. A row of small scales exists on the suprascapular region, but there are no other scales, nor any bony or spinous points on the head.

The scales are cycloid and of smaller size than those of *Scarus*, there being forty-eight in a longitudinal row between the gill-opening



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Wolf del. et lith.

FRESHYTES ALBIGENA. Gray

and caudal ; seven rows above the lateral line anteriorly, and fourteen below it.

The scales are oblong, with parallel or converging sides, a truncated or rounded base and a rounded or conical free end. Fine striae, from twelve to twenty in number, diverge from the centre towards the base, but do not produce lobes or crenatures on the margin ; there are some fainter diverging striae anteriorly. The lateral line is arched over the pectoral, and afterwards descends gradually, till opposite the three last dorsal spines, from whence it holds a straight course down the middle of the tail and runs out to the middle of the caudal membrane. It is formed of a series of single straight tubes, and is nearly perfectly continuous, especially posteriorly.

The dorsal spines are slender, and end in soft flexible tips. The first spine stands over the base of the lowest pectoral ray, and is the tallest* ; the others gradually diminish in height to the penultimate one, which is a little shorter than the last one ; the soft rays are forked, and rise abruptly to nearly twice the height of the posterior spines. The anal, of similar height and shape to the soft dorsal, has its commencement and end a little posterior to those of the latter. The rather small ventrals are attached opposite to the third dorsal spine. The caudal is rather large, and is crescentic at the end with projecting points, of which the upper one is the longest.

In general colour the fish appears from Mr. Neill's figure to be blackish-green, deepening nearly to black on the back and dorsal fin. A deep prussian-blue streak covers the second pectoral ray, and there are two broader, interrupted ones on the caudal, viz. between the longest rays of the caudal above and below and the ray immediately interior to them. The iris is likewise blue, and there is a blue spot on the nostrils. These streaks are to be traced on the specimen, but have changed to green. The female differs in being much paler (a dull leek-green in the dried specimen), and in wanting the blue streaks. The lobes of its caudal also are less prolonged.

2. DESCRIPTION OF A NEW SPECIES OF MONKEY, RECENTLY LIVING IN THE SOCIETY'S MENAGERIE. BY JOHN EDWARD GRAY, ESQ., F.R.S. ETC.

(Mammalia, Pl. XVI.)

PRESBYTIS ALBIGENA. Grey-checked Presbytis.

Black ; throat, sides of the neck and front of the chest greyish ; face black, nearly bald, with a few short, rigid, black hairs on the lips ; a tuft of elongated rigid hairs over each eye ; the cheeks are covered with short, adpressed, greyish hairs. The hairs of the body are uniform black to the base, rather elongated and flaccid, forming a fringe along each side, and a compressed crest on the crown and

* The artist has inadvertently drawn the first dorsal ray a little shorter than the second one, not having noticed that its tip was bent backwards in the specimen put into his hands.

nape. The hands and feet are short; the fore-thumb is small, the hinder one rather large and broad.

Hab. West Africa?

This species is very like *Presbytis obscurus*, but it is blacker, and has no pale spot on the nape, and the hair of the body is much longer, more silky, and forms a compressed crest on the nape, which is quite wanting in *P. obscurus*.

It is more like *P. melalophus*, but differs from it in being black, and can scarcely be a black variety of that species.

SIR RODERICK MURCHISON exhibited the head of a fish belonging to the genus *Clarias*, from the river Limpopo, and a portion of the skull of *Phacocheerus aethiopicus*, which had been collected by Capt. Vardon, during his recent travels in South Africa. The *Clarias* had been seen by Mr. Oswell, and identified by him as being a species also found in the river Zonga, which flows out of the newly discovered Lake. In directing the attention of the meeting to what may be regarded as the first indication which has reached us of the zoology of that most interesting region, Sir Roderick Murchison gave a summary of the knowledge already obtained by African explorers of the character of the country surrounding the Lake, and of the speculations in physical geography to which their discoveries have given rise.

Mr. R. C. Griffith exhibited some specimens of the "Tsetse," which had been entrusted to him for that purpose by Capt. Vardon. Sir Roderick Murchison having given some account of the supposed effects of the sting of this fly, Mr. Westwood undertook to describe the insect more particularly, as it appeared to be new to science, at a future meeting of the Society.

The Secretary exhibited some cocoons of a species of *Saturnia*, "the famous wild silk-worm from Leotang in Mantchouria," which had been transmitted to this country by Mr. Rutherford Alcock, Her Majesty's Vice-Consul at Shanghai, and obligingly presented to the Society by Dr. Lindley.

April 23, 1850.

R. H. Solly, Esq., F.R.S., in the Chair.

The Secretary reported that he had received a letter from Lord Harris, Governor of Trinidad, announcing his Excellency's intention of presenting some living animals from that island, and from Venezuela, to the Society.

The Secretary also stated that he had succeeded in purchasing for the Menagerie two healthy young specimens of *Phacocheerus aethiopicus*, the Vlack Vark, from Port Natal. They are stated by the importer to be about fifteen months old. (Mammalia, Pl. XVII.)



Printed by H. M. Mammalia, & W. H. Mammalia

PHACCHÆRUS ETHIOPICUS JUV

Wolf del. et lith

The following papers were read :—

1. ON THE GARRULINE BIRDS, OR JAYS; WITH DESCRIPTIONS OF NEW SPECIES. BY CHARLES LUCIEN, PRINCE BONAPARTE.

(Aves, Pl. XVII.)

Having elevated the *Garruline Crows* to the rank of a full family, the forty-eighth of my Natural Classification of Birds, I now consider the family *Garrulidæ*, (including, besides the *Glaucopinæ*, *Baritinæ*, and the *Jays*, also the *Hopping Magpies*, notwithstanding their stronger bill and closer relation to the *Corvidæ*,) as formed of four different groups (subfamilies or great genera as you may call them, according to your notions, and you admit or not subgenera). And I say four, although I do not separate the Magpies from the Jays, but consider them as *Garruline*, because to the three old subfamilies, *Baritinæ*, *Glaucopinæ* and *Garrulinæ*, I now add a fourth, for the reception of a good many birds hitherto scattered in different families, whose affinity to the Jays, taken for mere analogy, is now clear and manifest to my eye. *Garrulax*, *Actinodura*, *Oriolia*, *Turnagra*, or rather *Otagon*, distinct from the much more Garruline *Keropia*, with those *Kittæ* which are not *Coraciinæ*, are all members of this my new group, to which (however enlarged) I give or rather *preserve* the name *Ptilorhynchinæ*, as it includes also *Chlamydera* and *Ptilorhynchus*, which in *Sturnidæ* were out of their place. But the object of the present paper is merely the enumeration of the genera and species of my Garruline subfamily.

The first that we meet, ending the *Ptilorhynchinæ* with *Keropia*, which may as well be the first of Garrulinæ, is the genus *Platylophus*, Sw., judiciously changed by G. R. Gray, 1840, into *Lophocitta*, hitherto composed of but one species from Java, to which I now add a second from Sumatra, introducing to you the bird called *Garrulus histrionicus* by Solomon Müller, struck in the native woods where he discovered it by its mimic gestures, whilst the skins he sent to the Leyden Museum suggested the name of *Garrulus rufulus*, Temminck, than which there can be no better for closet-naturalists. I introduce it thus in the *Systema Naturæ*.

LOPHOCITTA HISTRIONICA, Bp. *Minor: fusco-ferruginea; collari nigro; maculæ utrinque colli magnæ, supraoculæ parvæ, albæ.*

Synonyms.

Garrulus histrionicus, Müll.

Garrula rufula, Temm. Fig. nulla.

Hab. Sumatra; Borneo.

The old species will stand as follows :

LOPHOCITTA GALERICULATA, Gr. *Major: nigra; collari nullo; maculæ utrinque colli magnæ, supraoculæ parvæ, albæ.*

Synonyms.

Corvus galericulatus, Cuv.

Lanius scapulatus, Licht.

Lanius coronatus, *Raffles*; *Levaill. Hist. Nat. Parad.* t. 42.

Hab. Java.

The second genus of the family will be my *Perisoreus* or the *Dysornithia* of Swainson, a northern group composed also of two species only, both well known, the European and Asiatic *Perisoreus infaustus* and the American *Per. canadensis*; for *brachyrhynchus*, Sw., is the young of the latter; and as to *Garrulus ferrugineus*, Bechstein, we cannot think of admitting it as distinct, although sustained by Wagler; plate 48 of Levaillant, on which alone it is based, being much more like *Perisoreus infaustus* than the very plate 47 constantly quoted under that name.

Third comes the true *Garrulus*, peculiar to the Old World, composed of our common Jay with its five closely-allied (or mere races), and two other more distinct, though hardly less typical, species; one of which, the chief object of the present paper, is certainly by far the handsomest, if not at the same time the largest, resembling most, especially by the small, lanceolate, white-shafted feathers of its throat, with barbs still more disjuncted, *Garrulus lanceolatus* of Central Asia, so well figured by Gould in his 'Century of Himalayan Birds'; which may be appreciated also in its adult state under the name of *Garrulus gularis*, and in immature plumage under that of *Garrulus Vigors* among the 'Illustrations of Indian Zoology.' Our new species, notwithstanding its stouter and longer feet, its higher and much more compressed bill, and elongated square tail, can by no means be called aberrant.

(Aves, Pl. XVII.)

GARRULUS LIDTHI, Bp. *Rufo-vinaceus; capite colloque ex totis, alis, caudæque, saturatè azureis; fronte lorisque nigricantibus; plumis gulæ lanceolatis, barbulis disjunctis, rachidibus albis; tectricibus alarum nigro-fasciatis: remigibus, rectricibusque apicem versus nigricantibus, apice ipso albo.*

Long. 13 poll.; rostr. $1\frac{1}{2}$ poll.; alæ 7 poll.; caudæ $5\frac{1}{2}$; tars. $1'' 8'''$.

Typicus; quamvis ad ACTINODURAM accedens simul et ad CYANOPICAS!

Rostrum albidum, altum, valde compressum: cauda elongata, æqualis.

Color azureus capitis et colli sensim in rufo-vinaceum dorsi et abdominis transiens.

Hab. The precise country of this Jay is not known; but Asiatic as it shows, and all circumstances induce us to believe, it must live in some very remote and unexplored occidental spot of China or Indo-China. The specimen described formed part of Baron van der Capellen's collection, purchased after the death of that Dutch governor of Malasia by Prof. van Lidth de Jeude of Utrecht. I detected it last week during a visit I paid to that most splendid perhaps of private collections with my learned friend Schlegel*.

* We had a double object in view in visiting Utrecht and the munificent Professor, to whom it is more justice than compliment to dedicate his new Jay: 1. Of admiring the only adult bird in collections of the Japanese Sea-Eagle (*Haliae-*



The tail alone, strongly rounded, would be sufficient to distinguish from our new species, and indeed from all others,

GARRULUS LANCEOLATUS, Vig. *Cano-vinaceus*: pileo genisque nigris: gula juguloque nigricantibus plumis lanceolatis, rachidibus albis: tectricum alarum minorum exterioribus candidis, corpori proximioribus nigerrimis absque fasciis: remigibus rectricibusque cæruleis nigro fasciolatis: cauda valde rotundata, apice alba.

Synonyms.

Garrulus gularis, J. Gr. *adult.*

Garrulus Vigorsii, J. Gr. *juv.*

III. Ind. Zool. i. t. 10 & t. 9.

Hab. in Asia centrali, Himalaja.

N.B. The small coverts which in all other Jays are blue banded, in this are plain black and white (bipartite); which latter colour on the contrary is wanting on the quills, beautifully striated blue and black as are the small coverts of the others.

The comparison with this last species was the only one necessary to establish; but, considering that no little difficulty is met with in discriminating the different European and Asiatic Jays, and what a confusion prevails among the synonyms of the remaining, which may be considered as six races of the same great species, I shall try to take advantage of my long experience, peculiar fancy for the group, and especially of the rich collection I now have at my command, in order to point out their discrepancies.

1. **GARRULUS GLANDARIUS**, Vieill. *Cinereo-vinaceus*, dorso orbitisque concoloribus: pileo albo-cinereo, plumis elongatis medio nigris: genis rufescentibus: gula juguloque albis: remigibus primariis extus basi albis; secundariis obsolete cæruleo-fasciolatis: rectricibus nigris subfasciolatis. *Major*: rostrum validum.

Synonym.

Corvus glandarius, L. &c.

Pl. Enl. 481; *Levaill. Parad.* t. 40, 41; *Gould, Eur.* t. 214.

Hab. Europ. s. occ. et m. ab Hispaniâ ad Græciam.

tus pelagicus, leucopterus aut imperator), whose monstrously powerful bill must really be *thunderstriking*! 2. Of ascertaining the supposed new species of *Microglossus*, of which you may have read in the 'Comptes Rendus' of the French Academy, and which I am delighted to say proves to be a specimen of the oldest known, more likely to get the second abolished than a third established. Schlegel (whose observations I shall always be happy to collect and profit by) declared that the two species of *Microglossi* will henceforth stand in precisely the same relation as the two *Coracopsis* (which he of course called *Vasa*) to each other. But even not considering that result of our investigation, our chief object would have become the least important, from the great variety of valuable and new animals we saw on all sides in the newly-built galleries and well-kept museum, especially among reptiles! And what can I say of the unique collection of fæstuses? Even Englishmen could not help being amazed at seeing in the midst of other wonders, the ELEPHANT and HIPPOPOTAMUS bottled up in spirits!

NO. CCVI.—PROCEEDINGS OF THE ZOOLOGICAL SOCIETY.

2. **GARRULUS JAPONICUS**, Schlegel. *Fusco-vinaceus, dorso concolore : pileo albo-cinereo, plumis elongatis maculis nigris expansis : orbitis, loris, remigibusque primariis basi externe nigris : secundariis cæruleo nigroque distincte fasciatis : rectricibus subunicoloribus.*

Synonym.

Garrulus glandarius, var. an nov. sp.? Patriæ ignotæ, *De Filippi, Cat. Mus. Mediolanens.* 1847, sp. 18; *Faun. Japonic. Av.* t. 43.
Hab. in Japan.

3. **GARRULUS KRYNICKII**, Kaleniczenko. *Cinereo-vinaceus, dorso orbitisque concoloribus : pileo nigro, plumis elongatis : cervice rufa : gula, genis, juguloque rufo-cinereis : remigibus secundariis unicoloribus : rectricibus mediis tantum fasciatis cæruleo-centibus ad basin. Major : rostrum robustum.*

Synonyms.

Corvus glandarius, var. pileo nigro, *Hohenacker, Enumeratio Anim. Schirwan*, in *Bullet. Soc. Nat. Mosc.* 1837, p. 141.

Garrulus Krynickyi, Kalenicz. *Bull. Soc. Nat. Mosc.* 1839, p. 319. t. 14.

Garrulus iliceti, *Mus. Lugdun.*

Garrulus glandarius melanocephalus, *Schleg. Rev. Critiq. Ois. Eur. et Faun. Japon.*, et *G. melanocephalus*, *Auct. quoad Av. Europ. nec Bonelli ; Susemihl, Eur. Vog.* 11. t. 6.

Hab. in Europa magis orientali et Asia occid. in Regionibus Caucasica et transcaucasica, Persia boreali, Crimea, Ukraina, Daouria.

4. **GARRULUS MELANOCEPHALUS**, Bonelli. *Cano-vinaceus, dorso orbitisque concoloribus : pileo nigro, plumis vix elongatis : cervice rufo-castanea : gula, genisque albis : subtus albido-cinereus : cæruleo alarum dilutiore, minus extenso : remigibus secundariis unicoloribus : rectricibus mediis omnino cæruleo-fasciatis. Minor : rostrum gracilius.*

Synonyms.

Garrulus atricapillus, *Geoffr.* 1832.

Garrulus iliceti, *Mus. Berolin.*

Pica stridens, *Ehrenb. ; Géné, Mem. Acad. Taur.* xxxvii. t. 1; *Levaill. jun. Exp. Alger. Av.* t. 6.

Hab. in Africa s. Syria, Arabia.

5. **GARRULUS BRANDTI**, Eversm. *Vinaceo-rufus, dorso cano ; orbitis nigris : abdomine cinnamomeo canescente : pileo rufo-cinnamomeo, plumis elongatis, vix maculato : remigibus secundariis externe candidis : rectricibus ad basin tantum obsolete fasciatis.*

Synonym.

Garrulus Brandti, *Hartl. Rev. Zool.* 1845; *Schleg. in Faun. Japon.* p. 83; *Brandt, Enum. Anim. Vert. Sib. Occ.* p. 25. sp. 104.

Hab. in Sibiria occid. et centr. Mont. Altai.

6. **GARRULUS BISPECULARIS**, Vig. *Cinereo-cinnamomeus, dorso*

orbitisque concoloribus : pileo immaculato, plumis vix elongatis : remigibus secundariis (uti tectrices minores) nigro cæruleoque fasciolatis.

Synonyms.

Garrulus ornatus, J. Gr. Ill. Ind. Zool. t. 10.

Garrulus bispecularis, Gould, Cent. Himal. B. t. 38.

Hab. in Asia Centrali, Nepal. Mont. Himalay.

N.B.—I do not know *Garrulus albifrons*, figured by J. Gray on plate 12 of the second volume of Hardwicke, Ind. Zool. Ill., but notwithstanding the authority of Hartlaub, judging as he does from the figure, I have no hesitation in declaring it is not a Jay.

The fourth genus of my *Garruline* subfamily is *Cyanogarrulus*, Bp., a North American group, dismembered from *Cyanocorax*, Boie, for the distinction of the Blue true Jays with shorter bills, short-tailed and crested, much more allied to the European *Garruli* than to the South American *Cyanocoraces*. Three species are known : *cristatus*, L., *Stelleri*, Pall., and *coronatus*, Sw.

Not professing Mr. Strickland's principles as to the appropriation of names, we borrow from him the classical one *Cyanocitta* for a fifth group, still composed of a dozen species of both Americas, such as *flavidanus*, *ultramarinus*, &c., of which genus we shall say no more on this occasion, in hopes that such elegant birds tinged with blue will shortly make their appearance in a peculiar monograph published in the same style and with the same joint authorship as the monograph of those birds tinged with red, the *Loxiinæ*, just ready to appear by the exertions of Dr. Schlegel and myself.

A sixth genus will necessarily be the one to which I restrict Boie's name of *Cyanocorax*, because even by their size and less brilliant colours they are really Blue Crows, such as *C. azureus* and *violaceus*, which latter, even by its nuchal ornament (beautiful ornamental spot), shows a passage on one side to *C. ornatus*, (which with the other smaller elegant species, such as *armillatus*, have again a tendency to the Jays;) and on the other, by *C. cayanus*, to the white-tailed species, much more crow-like, and which five, as they are, might constitute the group *Uroleuca*.

Then comes seventh, with its yellow tail, my new genus *Xanthura*, composed of three South American birds formed and coloured as *Corvus peruvianus*, one of which exhibits also the elegant nuchal spot which so much contributes to show the South American birds connected. The last of *Cyanocorax* must be the *Sanblasiana*, so abnormal as to deserve perhaps the generic appellation of *Cissilopha*. More than ever convinced of the propriety of using old names for modified groups, I persist of course in retaining that of *Cyanurus*, Swainsonian synonym of *Cyanocorax*, but recalling attention to the tail, for the Long-tailed Blue Jays with black bills : of these, two undescribed species appear to live in the far east of Asia, quite as beautiful as the two celebrated ones of occidental America, upon which so many names have been lavished :

1. **CYANURUS BULLOCKI**, Bp. *Cyaneus, subtus albus : gula, genis, pectoreque nigris : crista frontali parva : rectricibus duabus mediis mirifice elongatis, lateralibus apice latissime albis.*

Synonyms.

Pica Bullocki, Wagl. 1827.

Pica miles, Licht.

Pica formosa, Sw.

Garrula gubernatrix, Temm. Pl. Col. 436.

Psilorhinus gubernatrix, Gr.

Hab. in Mexico.

2. **CYANURUS COLLIEI**, Bp. *Cyaneus, subtus cum genis albus ; torque jugulari nigro : crista sincipitali magna : rectricibus mediis modice elongatis ; lateralibus apice latissimis albis.*

Synonyms.

Garrulus bullocki, Aud. nec Wagl.

Psilorhinus bullocki, Gr.

Pica Collieri, Vig. Zool. Beechey's Voy. f. 7.

Garrulus Burueti (err. bernetti, berneti and bennetti), J. Gr.

Garrulus ultramarinus, Aud. nec Bp. Am. B. t. 96.

Hab. in California.

3. **CYANURUS DAIRI**, Bp. *Cyaneus, subtus omnino albus : crista occipitali longa ; rectricibus mediis valde elongatis ; omnibus apice nigris.*

Hab. in Asia magis orientali, Corea.

4. **CYANURUS CUBO**, Bp. *Cyaneus, subtus antice niger : crista nulla : rectricibus mediis valde elongatis ; omnibus apice albis.*

Synonym.

San-zjak, Japonens. (which name applies also to the red-billed *Calocitta sinensis*).

Hab. in Asia magis orientali, Corea.

Naturalists acquainted with the two American species will see, independently of these phrases, how much more strongly the characters contrast between my two new Asiatic species than between the old American ones, although in some aspects they may be considered to bear to each other the same relations. At all events that I should be excused, if not justified, my Chinese *Black-billed Cyanuri* must on every account be followed and supported by Schlegel's own genus *Biophorus* and by its only species *Biophorus paradisiacus* of the Fauna Japonica, Av. Suppl. tab. B. Of this splendid bird also the portrait only has yet reached Europe, taken by a Japanese artist from the living bird under the eye of the celebrated Siebold, who is warrant of its correctness.

The next genus will be that of the red-billed, long-tailed, *Blue Magpies*, to which I give the name of *Calocitta*, not being able to apply to the group any older than that given to it by my friend Gray

in 1840, though since withdrawn when he had the untoward idea of making the most unnatural amalgamation of *Garruline* under his arrangement of *Psilorhinus*! Those who call it *Cissa* are evidently wrong. I know three Indian species, nor do I believe in many more, at least among the described. *Psilorhinus morio*, *fuliginosus* or *mexicanus*, therefore, would have to stand alone, as Rüppel probably intended it when he instituted the genus (excellent if not adulterated), if we had not from Chili a smaller new species as typical as the old one (*Psilorhinus chilensis*, Bp.).

Still less than the other intruders can *Gymnorhinus cyanocephalus*, Wied, be forced into it, as the name alone ought to have taught. That name, however, was preoccupied, when, in 1840, the Prince of Neuwied proposed it for his new genus: and it was very reluctantly, and after requesting in vain the author to change it himself, that I was compelled in 1842 to make it *Cyanocephalus*, calling the bird *Cyanocephalus Wiedi*, as a small compensation and a testimony of personal regard to the author, with whom I have long corresponded and prosecuted all kinds of satisfactory scientific affairs. Now, in 1850, he requests me to take his new name of *Gymnokitta*, and I most willingly adopt it, hoping that all ornithologists will make an exception to the rule of priority in this very peculiar case, in which, after all, the Prince of Wied claims his own genus with a better name.

Intermediate between *Garrulus* and *Pica*, we come now to my *Cyanopica*, a genus of *Blue Magpies* about which some English journalists have *chattered* like *pied* (or rather *paid*) Magpies! I subjoin here the phrases of its three species, that of Vaillant, Pallas, and Capt. Cook, now Widdrington (so closely allied as to be taken for three races of but one species), to show they are really distinct, although the characters hitherto assigned to them by the most clever and accurate naturalists may have proved inconstant and fallacious.

1. *CYANOPICA MELANOCEPHALA*, Bp. *Capite subcristato, ex toto cum gulo nigro: dorso cærulescenti: rectricibus omnibus albo terminatis.*

Synonyms.

Corvus cyaneus, Lath., Vieill.

Pica melanocephalus, Wagl.

Cyanopica Vaillanti, Bp. in litt.; *Levaillant*, Ois. Afr. t. 58.

Hab. in China.

2. *CYANOPICA CYANEA*, Bp. *Capite lævi, supra tantum nigro-chalybæo: dorso cinereo-vinaceo, nucha vix canescente: rectricibus lateralibus apice tantum albis, mediis valde elongatis late albo terminatis.*

Synonyms.

Corvus cyaneus, Pall.

Pica cyanea, Wagl., Schleg.

Cyanopica Pallasi, Bp. in litt.; *Faun. Japon.* t. 42.

Hab. in Asia orientali, Daouria, Japan.

3. *CYANOPICA COOKI*, Bp. *Capite lævi, supra tantum nigro-chalybæo: dorso cano-rubello, nucha albicante: rectricibus lateralibus late albo terminatis, mediis modice elongatis vix apice albis.*

Synonyms.

Pica cyanea, Cook.

Pie bleue d'Europe, *Schlegel* (*Cyanopica europæa*).

Cyanopolus Cooki, Bp. *Brit. Assoc. Birmingham*. 1849; *Gould, Eur.*

t. 217; *Susemihl, Eur. Vog. t.*

Hab. in Eur. mer. Hispania.

We are thus arrived to the genus *Pica*, Br., or true Magpie (*the pied long-tailed*), which, as we observed from the beginning, must close the *Garruline* series, which it connects with the *Corvidæ*, showing as much affinity to those larger Crows as the first of the Jays do to the smaller Shrikes or *Laniidæ*. Of such Magpies we know eight species perfectly typical and quite close to each other, whilst two birds still allowed to remain in it are abnormal, each deserving of a genus by itself: to both these birds, however different in form and colour, the name of *Corvus caledonicus* has been applied, one of which is the slender-billed, more jay-like *Pica albicollis*, Vieill., *Garrula torquata* of the 'Pl. Col.' of Temminck, to which the generic name of *Streptocitta* might be applied; whilst I propose that the name of *Gazola* (so congenial in this our family), applied to the legitimate *Corvus caledonicus*, should honour the person and perpetuate the martyrdom of a highly refined and scientific ecclesiastical friend of humanity, the lost victim of clerical machinations!

2. MONOGRAPH OF *SPHÆNIA*, A GENUS OF LAMELLIBRANCHIATE MOLLUSCA. BY ARTHUR ADAMS, R.N., F.L.S. ETC.

(Mollusca, Pl. X.)

In the unrivalled Collection of Mr. Cuming is a group of Bivalve shells, which appear to be neither *Mya* nor *Corbula*, but partaking of the characters of each. The animal, which is also preserved in spirits, resembles that of *Corbula* in having short united siphons, a small compressed foot, and in the mantle being closed, with the exception of an anterior elliptic opening; the shells, however, have the hinge of *Mya*, but do not gape at both extremities. The only genus, therefore, into which they resolve themselves is *Sphænia* of Turton, which, with the hinge of *Mya*, gapes only at one end, and which moreover is deprived of a long coriaceous siphon. Mr. Hanley has published one species in the 'Zoological Proceedings,' under the name of *Mya semistriata*, and M. Deshayes another, under that of *Corbula decussata*, in the 'Magazin de Zoologie,' 1844, and I had described a third, under the name of *Sphænia Mindorensis*, in the 'Zoology of the Voyage of H.M.S. Samarang;' and to these I now add several other large exotic species collected by Mr. Cuming.

SPHÆNIA, Turton.

Animal ovatum; pallium anticè clausum, præter aperturam pro pede parvo digitiformi sulco byssali instructo; siphones con-nati usque ad extremitates, orificia cirrata; siphon analis val-vulâ tubulari membranaceâ extra orificium productâ.

Testa oblonga, inæquivalva, inæquilateralis, magis minusve posticè hians; lævis, vel rugosa, epidermide tecta; umbones incurvati; cardo dente laminari dilatato erecto in valvulâ sinistrâ, alveo convenienti in valvulâ dextrâ; ligamentum internum; impres-siones pallii sinu parvo.

Animal ovate; mantle closed in front, except an opening for the passage of a small digitiform foot furnished with a byssal groove; siphons united to their extremities, their orifices cirrated; anal siphon with a tubular membranous valve projecting beyond the orifice.

Shell oblong, inequivalve, inequilateral, more or less gaping posteriorly; surface of the valves smooth or rugose, covered with an epidermis; beaks incurved; hinge composed of an erect, dilated, laminar tooth in one valve, with a corresponding pit in the other; ligament internal; pallial impression with a slight sinuation.

SPHÆNIA BINGHAMI, Turton. *S. testâ inæquivalvâ, inæquilaterali, ovato-trigonalî, transversim concentricè sulcatâ, epider-mide olivaceo tectâ; latere antico breviorè, rotundato, postico longiorè, hiantè, subtruncato; impressione pallii sinu subpro-fundo, rotundato; dente cardinis valvulæ sinistræ posticè sub-sinuato.*

Hab. in littoribus Britannicis.

Shell inequivalve, inequilateral, ovately trigonal, transversely concentrically sulcated, covered with an olivaceous epidermis; anterior side shortest, rounded, posterior side longest, gaping, subtruncate; sinus of pallial impression rather deep and rounded; tooth of left valve posteriorly sinuated.

Hab. British islands.

SPHÆNIA DECUSSATA, Deshayes, sp. *S. testâ ovato-oblongâ, sub-æquilateralî, posticè truncatâ, subrostratâ, rostro basique obli-què carinatâ, albâ, striis longitudinalibus, transversisque tenuissimè decussatâ; umbonibus magnis, oppositis; dente car-dinali magno, obliquo, compresso in valvâ sinistrâ, in valvâ dextrâ foveolâ profundâ, marginatâ.*

Hab. in Sumatræ maribus.

Shell ovately-oblong, subequilateral, posteriorly truncated, sub-rostrate, beak and base obliquely carinated, white, very finely decus-sated with longitudinal and transverse striae; umbones large, oppo-site; cardinal tooth large, oblique, compressed in the left valve, in the right valve a deep margined pit.

Hab. Seas of Sumatra.

SPHÆNIA SEMISTRIATA, Hauley, sp. *S. testâ albâ, transversâ, ovali, inequilateralî, concentricè striatâ; latere antico breviorè,*

valdè convexo, lævi; postico longiore, angustiore, truncato, radiatim striato; margine ventrali in medio sinuoso, posticè angulato, anticè rotundato.

Hab. — ?

Shell white, transverse, oval, inequilateral, concentrically striated; anterior side shortest, very convex, smooth; posterior side the longest, narrower, truncated and radiately striated; ventral margin sinuated in the middle, angulated posteriorly, rounded anteriorly.

Hab. — ?

This species have sculpture similar to *Sp. princeps*, but the valves are more gibbous, especially at the anterior part; the shell is much thinner, and the general outline different.

Mya semistriata, Hanley, *Zool. Proc.* 1843.

SPHENIA PRINCEPS, Adams. *S. testâ magnâ, albâ, transversâ, ovali, inequilaterali, concentricè striatâ; latere antico, longiore, rotundato, lævi; postico brevior, angustato, subtruncato, radiatim sulcatâ; margine ventrali arcuato, integro; impressione palliali vix sinuatâ; dente cardinis emarginato.*

Hab. in insulis Philippinis.

Shell large, white, transverse, oval, inequilateral, concentrically transversely striated; anterior side longest, rounded and smooth; posterior side shortest, narrow, subtruncated and radiately sulcated; ventral margin arcuated and entire; pallial impression with a slight sinus; hinge with the edge of the cardinal tooth of the left valve emarginate.

Hab. Philippine Islands; *H. C.* (Mus. Cuming.)

SPHENIA ELLIPTICA, Adams. *S. testâ transversâ, ovali, subæquilaterali, albâ, fragili, utrinque rotundatâ, epidermide tenui partim oblectâ, concentricè striatâ; latere antico lævi, postico radiatim striato; impressione pallii vix sinuatâ; dente cardinis sæpe valdè anticè fissô.*

Hab. in Australasiâ.

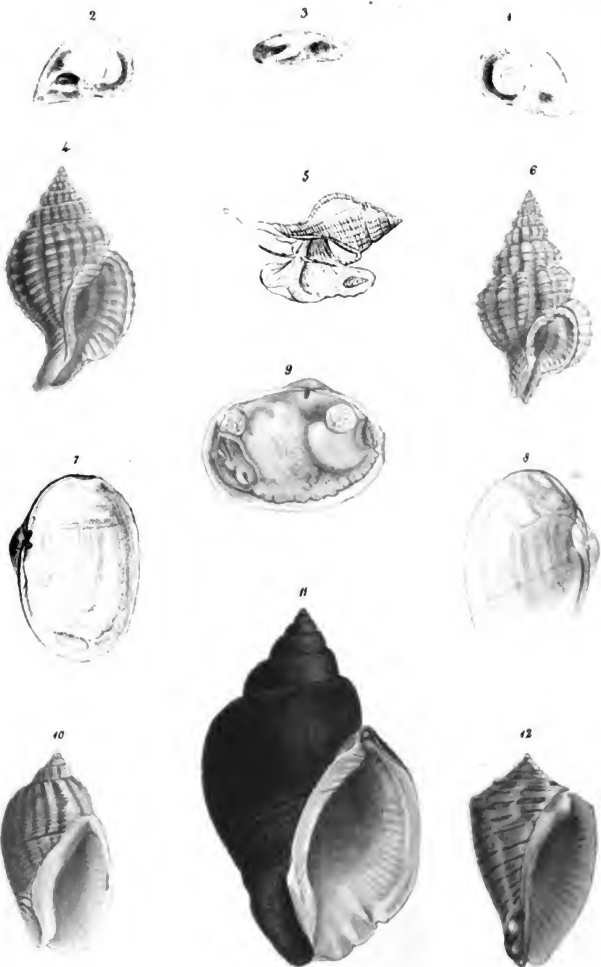
Shell transverse, oval, subequilateral, white, fragile, rounded at both ends, partially covered with a slight epidermis, concentrically striated; anterior side smooth, posterior side radiately sulcated; sinus of pallial impression very shallow; hinge with the tooth of the left valve often deeply fissured anteriorly so as to exhibit an apparent distinct anterior tooth.

Hab. Sydney, 4 fathoms, mud; *Mr. F. Strange.* (Mus. Cuming.)
Mus. Hanley.

SPHENIA DECURTATA, Adams. *S. testâ transversâ, ovali, subæquilaterali, albâ, concentricè transversim sulcatâ; longitudinally tenuissimè radiatim striatâ; anticè latiore, rotundatâ, posticè angustatâ, angulatâ, abruptè truncatâ; margine ventrali arcuato, integro; impressione pallii sinu parvo; dente cardinis anticè valdè fissô.*

Hab. in insulis Philippinis.

Shell transverse, oval, subequilateral, white, transversely concentri-



cally sulcated; longitudinally very finely radiately striated; anteriorly rounded and wider, posteriorly narrower, angulated and abruptly truncated; ventral margin arched, entire; pallial impression with a small sinus; hinge with the tooth of the left valve deeply fissured anteriorly.

Hab. Catanuan, province of Tayabas, island of Luzon, in sand at low water; *H. C.* (Mus. Cuming.)

SPHÆNIA PHILIPPINARUM, Adams. *S. testâ ovali, transversâ, subinæquivalvâ, albâ, tenui, ventricosâ, inæquilaterali; latere antico longiore, rotundato, lævi; postico brevior, radiatim striato, viz truncato; epidermide fusco tenui tectâ; margine ventrali interdum subsinuato; impressione palliali sinu parvo; dente cardinis valvulæ sinistræ trilobato.*

Hab. in insulis Philippinis.

Shell oval, transverse, slightly inequivalve, thin, white, ventricose, inequilateral; anterior side longest, rounded, smooth; posterior side shortest, radiately striated, slightly truncated and covered with a very thin brown epidermis; ventral margin sometimes slightly sinuated; pallial impression with a small sinus; hinge with the cardinal tooth of the left valve trilobate. (Mollusca, Pl. X. fig. 7—9.)

Hab. Sibunga, island of Zebu, fine sand, 30 fathoms; *H. C.* Bay of Manila, clayey sand, 6 fathoms; *H. C.* (Mus. Cuming.)

SPHÆNIA RÜPPELLII, Adams. *S. testâ transverso-elongatâ, transversè striatâ, epidermide fusco tectâ; latere antico brevior, rotundato, gibboso, obsoletè radiatim striato; postico longiore, angustior, subrostrato, truncato; dente cardinis valvulæ sinistræ subsinuato.*

Hab. in Mari Rubro.

Shell transversely elongated, covered with a reddish-brown epidermis, transversely striated; anterior side the shortest, rounded, gibbous, obsoletely radiately striated; posterior side narrower, rather beaked, widely gaping and truncate; tooth of left valve slightly sinuated.

Hab. Red Sea; *Dr. Rüppell.*

SPHÆNIA MINDORENSIS, Adams and Reeve.

Voy. Zool. Samarang, t. . f. .

May 14, 1850.

William Yarrell, Esq., V.P., in the Chair.

The Secretary stated that, through the liberality of Ronald Gunn, Esq., and Dr. Grant, of Launceston, the Menagerie had been enriched by the safe arrival of two living specimens of *Thylacinus cynocephalus* (Mammalia, Pl. XVIII.): and he read the following letter in reference to this most valuable and interesting gift, which has

added one of the rarest and most difficult forms to the series of Marsupials which have hitherto been exhibited in the Gardens :—

“ Launceston, Van Diemen's Land, 29th December, 1849.

“ SIR,—I have shipped on board the barque *Stirlingshire*, Chris'. Gwatkin, master, two living Thylacines (male and female) for the Zoological Society of London, and which I trust will reach you alive and well. Captain Gwatkin, whom I have known for some years, has promised his utmost personal care and attention to them during the passage home. I have put on board twelve fat sheep (together with hay for their sustenance) as sea-stores for the Thylacines, and have made every arrangement I could think of to ensure their safe arrival in London.

“ I have had the female in confinement for upwards of six months, and it has become sufficiently tame to permit its head to be scratched, or to be otherwise touched through the bars of its prison, without showing any anger or irritation. The male, for which the Society is indebted to my friend Dr. James Grant of Launceston, was only caught a month ago. We placed it at once with the female, with which it seems upon the best of terms, but it is not yet so familiar with the presence of man. I have purposely kept their cage close to the side of a path where many of my servants pass daily, and where my children are in the habit of playing, and I find that beyond a hissing noise made by the *male*, they do not seem at all disturbed by any one going close to them.

“ I have fed them exclusively upon mutton. They prefer the parts containing bones, and do not seem to relish the liver, heart, lights, &c.

“ Both these animals have been caught in snares upon the upper part of the St. Patrick's River, about thirty miles N.E. of Launceston.

“ The female, which was first caught, was placed for some time in a small unfinished house at the St. Patrick's until I could devise means of getting her down here; and when I sent a trustworthy person up for her, he assured me that she was excessively agile—springing from the floor to the top of the walls, 6 to 8 feet, and from joist to joist near the roof with the activity of a cat. He also informed me that the Thylacine will not eat the *Wombat*, an animal exceedingly abundant on the St. Patrick's River, and with which they attempted to feed it during the month it was there, previous to my having it brought down to my residence. Otherwise I have not had any great opportunity of observing any peculiar habits.

“ Both Dr. Grant and I continue to offer high rewards for living specimens, and you shall have all the benefit of our success, whatever it may be. The great increase of sheep in all directions obliges the shepherds to destroy them by every possible means, and they are rarely caught alive, or if so caught, are killed whilst in the snares. I am therefore more than usually anxious that these should reach you safely, and I have offered the Captain a proportionate reward for their delivery alive.



"An observation of mine, contained in a letter to Sir W. Hooker, and which was not meant for publication, has been misunderstood, and has led to the propagation of error—for which I am very sorry. In it I said the Thylacine's tail was *not compressed*—in reference to an observation of Mr. Swainson's in the 'Encyclopædia of Geography' (then recently published), that the tail of the Thylacine was compressed, *which suggested the supposition that it was used in swimming*, &c. It was to the latter part of this observation that my remarks were particularly applied (vide Annals of Nat. Hist. vol. i. p. 101-2), and I meant that the tail was not compressed to such an extent as to have justified the inference that it was useful in swimming; and thus that the animal obtained its food principally from the sea, which the paragraph in the 'Encyclopædia of Geography' implied. The tail is obviously slightly compressed, but not, I think, more so than the tails of the Dasyures, to which aquatic habits are not attributed. In writing hurriedly—and not for publication—I did not express myself with the precision I ought to have done. I mainly wished to point out that the tail would not justify the inference of Mr. Swainson (which I thought very far strained), that the animal was aquatic in its habits and piscivorous. Pray set me right whenever you have an opportunity.

"I beg to remain, Sir, yours very faithfully,

"RONALD C. GUNN."

"D. W. Mitchell, Esq., Secretary Zoological Society."

The Secretary then called the attention of the meeting to three eggs of the Wedge-tailed Eagle of Australia, *Aquila audax*, Lath., which had been recently laid in the Menagerie (Aves, Pl. XIX.), and which were probably the only perfect specimens yet known. The same female had produced two eggs in the spring of 1849, but they were immediately destroyed either by herself or the male, as fragments only were discovered by the keeper.

The following papers were read:—

1. DESCRIPTIONS OF NEW BIRDS. By J. GOULD, F.R.S. &c. &c.
(Aves, Pl. XX.)

It is no less interesting than true, that during the past two years we have had accessions in ornithology of no ordinary value; comprising as they do additional species of several anomalous forms, of each of which only one was previously known; for instance, we have a second species of the genera *Apteryx*, *Menura*, and *Ptiloris*. On the present occasion I have the good fortune to offer to the notice of this Meeting new species of two forms, equal in interest to those above referred to, viz. that of *Cephalopterus*, a form known to all as being American, and of which the type is the remarkable species *Cephalopterus ornatus*, commonly called the Umbrella Bird. The discovery of a second species of this form is due to the researches of M. Warzewickz, a gentleman who has just returned from Central America, after traver-

sing parts of that country hitherto untrodden by Europeans: it was in the high Cordillera of Chiriqué in Veragua, at an elevation of 8000 feet, that this bird was found, and of which the individual now exhibited was the only one procured.

CEPHALOPTERUS GLABRICOLLIS. (Aves, Pl. XX.)

This new species differs in many particulars from its congener, particularly in its smaller size, in the lesser development of its umbrella-like hood, and in its denuded fore-neck and chest, and in the absence of feathers on the base of the tab or appendage at the basal part of the neck. M. Warzewickz describes the bare part of the neck to be reddish orange, and the bare base of the tab as bright red. This fine bird forms part of the collection of T. B. Wilson, Esq., of Philadelphia.

Independently of the novelty just described, M. Warzewickz brought me six species of Humming Birds entirely new to science; these, with some other new species of the same group, I propose to characterize at a future meeting.

By Lord Gifford, who has recently returned from a journey in Thibet, ornithology has been enriched by the discovery of a new species of *Syrrhaptes*, a form as extraordinary in its way as that of any of those above noticed; the new species is finer both in size and colouring than the *Syrrhaptes paradoxus*; it was shot on the banks of the Stumerreri Lake, where two examples were seen, but unfortunately only one was procured; it appears to be an adult male, for which I propose the name of

SYRRHAPTES TIBETANUS.

Face hoary; front and sides of the neck ochreous yellow; feathers of the head and nape brown at the base, and alternately barred at the tip with black and white; upper part of the back, front and sides of the breast buffy white, crossed by narrow irregular bars of blackish brown; all the upper surface and wings buff, pencilled all over with dark brown, the pencillings being conspicuous on the back, and so minute on the wings as to be almost imperceptible; scapularies largely blotched on their inner webs with black; primaries and secondaries slaty black, the fourth, fifth, sixth, seventh and eighth primaries with an oblique mark of brownish white at the tip; basal half of the two centre tail-feathers buff, pencilled with brown, their apical half narrow, filamentous and black; lateral tail-feathers sandy red, crossed by three widely placed irregular bands of black, and tipped with buffy white; under surface buffy white, minutely pencilled on the breast with brown; legs of the same hue, but the feathers banded with faint bars of brown; bill and nails black.

Total length, $15\frac{1}{2}$ inches; bill, $\frac{4}{5}$; wing, 10; tail, $7\frac{1}{2}$; tarsi, 1.

Hab. Ladakh in Thibet.

Remark. Distinguished from the *S. paradoxus* by its much larger size, by the primaries not being extended into the filamentous form so remarkable in that species, and by the absence of any black colouring on the breast.



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CEPHALOPTERUS GLABRICOLLIS Gould

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The only example which has come under my notice is in the possession of the Rt. Hon. the Lord Gifford, to whom I am indebted for permission to include a figure of it in my work on the 'Birds of Asia.'

Extraordinary as have been the new species discovered during the last few years, of that remarkable group the *Ramphastidae*, no one is more singular than the bird which I now submit to the notice of the Meeting; it may be regarded as an evidence that all the members of the group are not yet known to us, and that the productions of the rich forests of the Cordillerian Andes appear to be inexhaustible. It had long been my intention to propose a generic name for the Andean group of Toucans, characterized by the dense villose clothing of the under surface, the colouring of which is of a uniform tint, instead of being crossed by bars of black, red and yellow as in the typical *Pteroglossi*; and at no moment could such a step be more appropriately taken than at the present, when characterizing a new species of this section, for which, indicative of the country in which the members are found, I propose the generic term of *Andigena*, and for the new species, *A. laminirostris*; the other species pertaining to this genus are *A. hypoglaucus*, *A. nigrirostris*, *A. cucullatus*, and *A. Bailloni*. The new species *A. laminirostris*, which is distinguished by the yellow laminae near the base of the upper mandible, is the property of Dr. T. B. Wilson of Philadelphia, to whom and to his brother, E. Wilson, Esq., I am indebted for permission to describe this fine bird; the native habitat of which is the forests at the base of Pichincha, a high mountain of Ecuador.

Genus ANDIGENA.

Gen. Char.—Bill stout, swollen, and moderately large when compared with the bill of the true *Pteroglossi*; wings and tail very similar to those of *Aulacorhynchus*. General plumage long, loose, and hair-like.

The species belonging to this genus are—

Andigena hypoglaucus (*Pteroglossus hypoglaucus*, Gould).

— *cucullatus* (*Pteroglossus cucullatus*, Gould).

— *nigrirostris* (*Pteroglossus nigrirostris*, Waterh.).

— *laminirostris*, Gould.

— *Bailloni* (*Pteroglossus Bailloni*, Wagl.).

All are characterized by a uniform wash of colour on the under surface, in lieu of the bars of rich red and black so conspicuous in the true *Pteroglossi*.

ANDIGENA LAMINIROSTRIS.

Crown of the head and back of the neck deep black; upper surface golden brown; primaries black; rump pale sulphur-yellow; upper tail-coverts very dark green; tail dark slaty grey, four central feathers largely tipped with chestnut-red; under surface ashy blue; on either flank a large patch of rich yellow; thighs deep chestnut; under tail-coverts blood-red; orbits apparently orange; culmen and apical half of both mandibles black; a broad band on the base of

the upper mandible and the basal half of the lower mandible deep blood-red ; on either side of the upper mandible, immediately in front of the blood-red basal band, is a large buff-coloured plate or lamina, continuous with the structure of the bill at its base, but separate and detached in front, thin on its upper edge, but thicker and projecting beyond the edge of the mandible below ; feet slaty blue.

Total length, 18 inches ; bill, $3\frac{3}{8}$; wing, $6\frac{3}{4}$; tail, $6\frac{3}{4}$; tarsi, $1\frac{1}{2}$.

Hab. Neighbourhood of Quito.

Remark. The only example I have seen belongs to the collection of T. B. Wilson, Esq., of Philadelphia, and which has been kindly lent to me by his brother Edward Wilson, Esq., to enrich my Monograph of the *Ramphastidae*.

Equally inexhaustible appear to be the *Odontophorinæ* or *Partridges* of America, for in the rich Museum of Leyden, I lately found a species which was previously unknown to me ; it pertains to the genus *Odontophorus*, and I propose for it the name of *Odontophorus Columbianus*.

ODONTOPHORUS COLUMBIANUS.

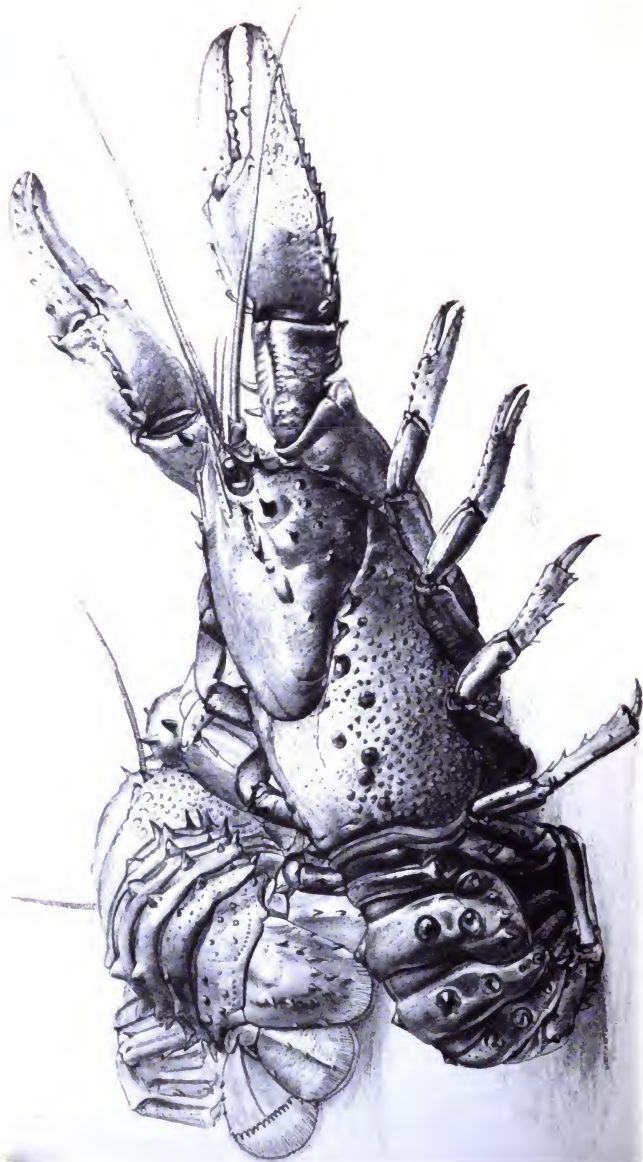
Crown of the head brown, minutely freckled with black ; back of the neck washed with rufous ; over each eye an indistinct mottled stripe ; throat white, irregularly spotted, especially on the sides, with black ; upper surface brown, washed with grey on the centre of the feathers, each of which is delicately pencilled with black, and has a narrow stripe of buff, bounded on each side by a narrower one of black, down the centre ; those of the scapularies and wing-coverts have moreover a large patch of rich dark brown on the inner web near the tip, bounded above by two narrow lines, one of buff, the other of dark brown ; primaries brown ; secondaries brown, freckled and barred with dark brown, and washed with rufous ; tertiaries brown, washed with grey and rufous, freckled with black, having a broad V-shaped mark of black near the tip, and broadly margined and tipped internally with deep buff ; under surface reddish brown, each feather with a large irregularly-shaped mark of white margined with black near the tip ; under tail-coverts, and vent mottled reddish brown and sandy buff ; bill black ; feet lead-colour.

Total length, 11 inches ; bill, 1 ; wing, $5\frac{3}{4}$; tail, $2\frac{3}{4}$; tarsi, 2 ; middle toe and nail, $2\frac{1}{4}$.

Hab. Caraccas.

Remark.—The fine specimen gracing the Museum at Leyden was transmitted by M. Landsberger, Netherlands Consul at Caraccas. There is also another specimen, from, I believe, the same locality, which differs in having the under surface of a nearly uniform greyish brown, with here and there a few of the white marks so conspicuous in the bird above described ; it is also of a somewhat smaller size, but notwithstanding these differences, the two birds appear to be one and the same species.

The *O. Columbianus* has a stouter bill, and is of a larger size than *O. dentatus*, but is smaller than *O. Balliviani*, to which it is most nearly allied.



POTAMOBIDAE SPERMATOPHYTES

Leaving America and India, and proceeding to Australia, I return to a country which has so long engaged my attention, to characterize a new genus of small creeping Insectorial Birds, nearly allied to the genera *Hylacola* and *Dasyornis*, under the name of *Pycnoptilus*, of which at present only a single specimen is known, and to which I beg to assign the specific name of *floccosa*; it is from New South Wales and the country towards the river Darling.

Genus PYCNOPTILUS.

Gen. Char.—Bill much shorter than the head; gonys and culmen gradually descending; upper mandible notched at the tip; *nostrils* covered with a distinct operculum; base of the bill beset with very fine feeble hairs; *wings* very short, round and concave, the sixth primary the longest; *tail* short, rounded, feathers very broad and of a soft texture; *tarsi* strong, and somewhat lengthened compared with the size of the bird; hind-toe strong, and armed with a rather long claw; fore toes and nails rather feeble, the outer and inner toes of equal length; plumage dense, lengthened and silky, especially on the flanks.

PYCNOPTILUS FLOCCOSUS.

All the upper surface, wings and tail rich brown; throat and breast sandy buff, the feathers of the latter with a crescent of brown near the tip; remainder of the under surface brown, approaching to white on the centre of the abdomen; under tail-coverts rusty red; bill and feet dark brown.

Total length, $6\frac{3}{4}$ inches; bill, $\frac{1}{2}$; wing, $2\frac{3}{4}$; tail, $2\frac{3}{4}$; tarsi, $1\frac{1}{2}$.

Hab. New South Wales.

Remark.—Received in a collection made on the upper part of the river Morumbidgee.

This form is somewhat allied to *Atrichia*, *Hylacola* and *Dasyornis*, but differs from all those genera in several particulars.

I cannot conclude this paper descriptive of several new and important birds, without congratulating the Society upon the means they possess of making known to the scientific world through their Proceedings and Transactions, spread far and wide as they are, not only over our own country, but I may say over the world, the many interesting objects which from time to time are brought before their Meetings; neither must I omit to bear testimony to the high estimation in which they are held by all the continental naturalists and every true lover of scientific research.

2. DESCRIPTIONS OF TWO SPECIES OF CRUSTACEA IN THE BRITISH MUSEUM. BY ADAM WHITE, ASSISTANT ZOOL. DEP. BRIT. MUS.

POTAMOBIVS SERRATUS. (Annulosa, Pl. XV.)

Cancer serratus, Shaw, *Zoology of New Holland*, t. 8.

Beak shorter than the peduncle of the outer antennae, with three teeth on the outside, above hollowed and slightly grooved down the

middle, edges over the eyes considerably thickened. Hands, outside with a double row of serratures extending to near the end of the fixed claw; inside edge serrated with four teeth and one tooth at the end; moveable claw with six or seven teeth placed irregularly but chiefly on the ridge; claws elongated, inner edge with a few bluntish teeth, the end somewhat hooked. Wrist with each of the lateral edges furnished with two strong teeth or spines. Carapace smooth along the back; the sides of the front portion with a few spines, which on the lower part are almost reduced to tubercles; hinder part of the carapace separated from the front portion by a very deep groove, each of the sides in front with two spines; the sides of this portion are thickly covered with tubercles, which increase in size as they approach the back. Abdomen smooth on the dorsal line, the sides spined; the first segment with a large prominent spine on each side of the first segment; second segment with twelve or thirteen spines, four or five on each edge of the dilated part, the other two larger and situated on the sides; the spines are more or less conical and sharp, the one on each side nearest the back blunt; the third, fourth and fifth segments with eight spines each, placed transversely, the two inner bluntest; the sixth segment with ten or eleven small spines or tubercles; the seventh or terminal segment with seventeen or eighteen small sharp spines arranged in a crescent-like figure, the convexity being outwards. The two posterior pairs of legs with the penultimate joint on the outside furnished with two rows of serratures.

Carapace and legs in the dead specimen of a dirty yellowish brown hue, tinged on the carapace with red. In Dr. Shaw's figure, which slightly differs from Pl. XV., this crayfish is coloured of a bright red, the sides of the claws, carapace and abdomen, are tinged with blue; the specimens, however, were preserved in spirits. Dr. Shaw does not mention from what part of New Holland the specimens described by him were received; I cannot find any trace of them, neither does any author that I am aware of refer to his figure or description.

The species comes closest to the *Potamobius (Astacus) Franklinii*, described with three other Australian species of the same genus by Mr. Gray, in the Appendix to Eyre's Discoveries in Central Australia, vol. i. p. 409, t. 3. f. 1.

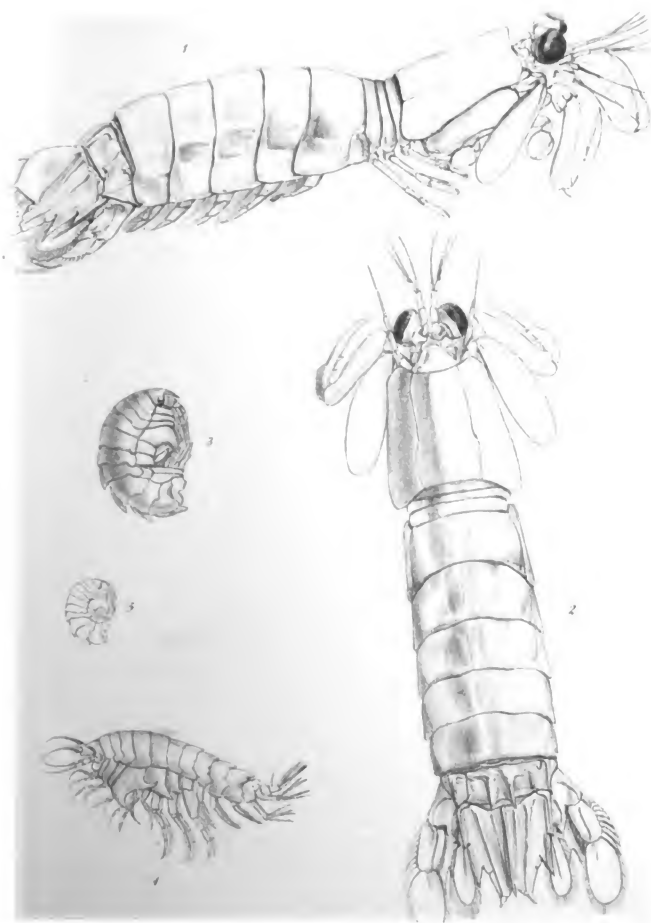
The specimen in the British Museum was found by Mr. Strange in freshwater creeks, Brisbane Water. Mr. Leicester informs me that the species is not uncommon also in the Richmond River.

GONODACTYLUS CULTRIFER, n. sp.

(Annulosa, Pl. XVI. fig. 1, 2.)

In a Chinese collection, part of which was acquired by the British Museum, there occurs a *Gonodactylus* quite distinct from any of the species of this genus which have been described. This species enters into the second section of Prof. Milne-Edwards, in which the rostral plate is rounded, or scarcely pointed, in front. From the elevated compressed process on the seventh abdominal ring, this species may be called *G. cultrifer*.

The sides of the carapace are very thin and membranaceous. The rostral plate is wider than long, but not so wide as in the *G. scyl-*



1-2 GONODACTYLUS CULTRIFER
3-5 ACANTHONOTUS TESTUDO

larus, neither is the tip so much deflexed as in that species. The raptorial legs are rather slender, and are considerably compressed, the base of the terminal joint is very slightly thickened, the terminal part elongated and knife-shaped, the inner edge with two teeth; tarsi of the three last pair of legs styloform; abdomen with the lateral margins of the first five segments thin and membranaceous, the fifth with a notch at the hind angle; the sixth segment with six slight crests terminating in short spines, the two middle approximating; the seventh segment with a sharp crest which rises nearly as high above its dorsal surface, as the space between its base and the edge of the segment; the end of this crest is pointed; the marginal teeth of the seventh segment are long and sharp, and have a slight ridge behind; the penultimate joint of the outer branch of the appendages to the sixth ring long, and furnished on the outer edge with a series of nine spines, which are depressed, and cover each other at the base. In the *G. scyllarus* there are twelve of these spines.

This species is about four inches long; in its dry state the greater part of the upper surface is tinged with a reddish hue, and along the middle of the back there is a pale line.

The species of the genus *GONODACTYLUS* are,—1. *G. chiragra*; 2. *G. scyllarus*; 3. *G. Edwardsii*, Berthold, Act. Göttingen. 1845, t. 3. f. 6; 4. *G. cultrifer*; 5. *G. styloferus*; 6. *G. graphurus*; 7. *G. trispinosus*. The *G. Edwardsii* is the species met with in nearly every box of insects and fish imported from China.

On the same plate with the *G. cultrifer* is figured an Amphipod, which *may be* the species figured by Colonel Montagu in the ninth volume of the 'Linnean Transactions,' t. 5. f. 5, under the name of *Oniscus Testudo*. I have named this on the plate *Acanthonotus Testudo*: it belongs to Prof. Owen's genus *Acanthonotus*: in the British Museum it bears Dr. Leach's manuscript name, *Vertumnus Cranchii*. The head is produced and pointed between the antennæ, and instead of the small number of segments assigned by Colonel Montagu to his *Oniscus*, there is the normal number of the various genera of Amphipoda.

3. DESCRIPTION OF A NEW PUPINA AND TWO NEW HELICINAS, FROM THE COLLECTION OF H. CUMING, ESQ. BY DR. L. PFEIFFER.

1. PUPINA BILINGUIS, Pfr. *P. testâ oblongo-ovatâ, tenui, pellucidâ, nitidâ, cornâ; spirâ sensim attenuatâ, obtusiusculâ; suturâ impressâ, vix callosâ; anfractibus 6, supremis 3 convexis, confertim striatis, sequentibus subplanis, lævigatis, ultimo ½ longitudinis paulo superante; aperturâ verticali, subcirculari, bicanaliculatâ, canali utroque aperto, ascendente, supero lamina validâ, linguiformi, triangulari formato; peristomate subincrassato, breviter expanso, margine columellari plano, linguiformi, acuto.*

Long. 10, diam. 5 millim.

Hab. in Australiâ orientali.

NO. CCVII.—PROCEEDINGS OF THE ZOOLOGICAL SOCIETY.

2. *HELICINA INTUSPLICATA*, Pfr. *H. testá depresso-globosá, tenuiusculá, lævigatá, nitidá, carnéá; spirá breviter conoidé, vix acuminatá; anfractibus fere 5 conveziusculis, celeriter accrescentibus, ultimo rotundato, basi planiusculo; columellá recedente, planá, retrorsum in callum tenuem dilatatá; aperturá parum obliquá, semiovali-subtriangulari, altiore quam latá, ad columellam angulatá et plicá intus fere ad marginem decurrente munitá; peristomate simplice, breviter expanso, margine basali ad columellam subangulato.*

Diam. 10, alt. $7\frac{1}{2}$ millim.

Locality unknown.

3. *HELICINA DIAPHANA*, Pfr. *H. testá subconoideo-depressá, tenui, obliquè striatulá, diaphaná, nitidulá, fulvo-lutescente; spirá subelevatá, apice obtusá; anfractibus 4 planiusculis, ultimo obsoletè subangulato; columellá brevissimá, basi sub-nodosá, in callum circumscriptum, sub lente granulatum retrorsum dilatatá; aperturá subobliquá, semilunari; peristomate simplice, breviter expanso, margine basali leviter arcuato, in nodulum columellarem sensim transiente.*

Diam. 5, altit. $3\frac{1}{2}$ mill.

Hab. Honduras; *Mr.* Dyson.

May 28, 1850.

William Yarrell, Esq., Vice-President, in the Chair.

The Secretary reported, that on the morning of the 25th of May he had the gratification of finding, on the arrival of the Peninsular and Oriental Company's steamer "Ripon" at Southampton, that the preparations which had been made in that vessel, and the precautions which had been taken by the Hon. C. A. Murray, for the safe transport of the Hippopotamus, had been eminently successful.

The animal had been assiduously attended during the voyage by Hamet Saafi Canana, to whom he had been entrusted since his arrival in Cairo on the 14th of November 1849, and towards whom he exhibits a very marked attachment. Mr. Murray, having returned to England in the "Ripon," had continued to direct this interesting undertaking to its final success. Captain Moresby and the officers of the "Ripon" had given every facility and assistance in their power throughout the voyage; and, owing to the liberal provision which had been made both in Egypt and at Malta, the supply of fresh water required for the animal's bath had been constant and abundant.

The Hippopotamus was shut into his house with Hamet about 10 o'clock A.M. The house was then hoisted by a tackle from the main deck, and safely lowered to a railway truck on the quay at the New Dock. As soon as the other animals were landed, and arranged for the journey to London, they were conveyed by special train to Nine Elms, and ultimately reached the Garden at 10 P.M.

The house in which the Hippopotamus and Hamet were inclosed having been taken from the waggon, the animal readily followed Hamet, on the door being opened, to the building which had been prepared for him. He had now been twelve hours out of the water; and as soon as he discovered the bath, which had been filled in anticipation of his arrival, he plunged into it with the most evident enjoyment. (Mammalia, Pl. XIX.) After this he fed freely on warm milk and meal, without exhibiting the slightest symptoms of fatigue, or of discomposure at the new situation in which he was placed.

The remainder of the collection, which had been gathered together by the unceasing energy of Mr. Murray, included—

Felis leo, ♀.
 „ *jubatus*, ♂.
 „ *chaus*.
Genetta pallida, Gray.
Viverra civetta.
Herpestes ichneumon.
Canis niloticus.
Capra nubiana.
Gazella dorcas.
Sus aper, ♀.
Dipus aegyptius.
Gerbillus melanura.
 „ *tenuis*.
Gyps fulvus.
Otogyps auricularis.
Casarca rutila.
Pelecanus crispus.
 „ *onocrotalus*.
Psammosaurus griseus.
Gongylus ocellatus.
Scincus vulgaris.
Cerastes Hasselquistii.
Naia haje.
Coluber Cliffordii.
Eryx jaculus.

Of these, the Lioness, the Chetah, the Ibex and the Wild Hog were gifts to the Society from H.H. the Viceroy, in addition to the Hippopotamus.

As if to make the 25th a still more memorable day in the annals of the Menagerie, another collection arrived within an hour of that which has been thus briefly mentioned. Lord Harris, Governor of Trinidad, desirous of making the opportunities of his important station available for the advancement of science at home, transmitted under the care of a trustworthy agent, and as a gift to the Society, a box of skins, which will be exhibited at a future meeting, and some beautiful living animals, among which there have arrived remarkable examples of the following species :—

Lagothrix Humboldtii.
Chiropotes satanas.
Penelope pipile.
 „ *cristata.*
Boa constrictor.

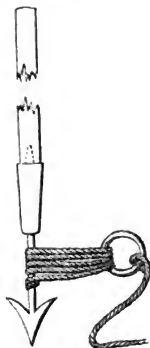
The imperfect knowledge which we possess of the zoology of Trinidad, and the proximity of that island to the Spanish Main, where so many interesting forms abound, render the support of Lord Harris a most valuable addition to the strength of the Society; and it is to be earnestly hoped that the liberal and unhesitating manner in which his Lordship, as well as the Governor of Singapore, have acceded to the applications which were made to them for assistance in promoting scientific objects, will be rivalled by the governors of our other colonies, who have necessarily effectual means of conferring the most important aid towards the progress of zoological inquiry.

The following papers were read :—

1. ON SHARK FISHING AT KURRACHEE. IN A LETTER FROM DR. BUIST, LL.D., F.R.S. ETC., OF BOMBAY, TO COLONEL SYKES. (COMMUNICATED BY COLONEL SYKES*.)

There are thirteen large boats, with crews of twelve men each, constantly employed in the shark fishery at Kurrachee; the value of the fins sent to market varying from 15,000 to 18,000 rupees, or 1000 to 1200 rupees for each boat, after allowing the Banian or factor his profit. One boat will sometimes capture at a draught as many as one hundred sharks of different sizes. The fishermen are very averse to revealing the amount of their captures. Inquiries of this sort are supposed by them to be made exclusively for the purpose of taxation. The average capture of each boat probably amounts to about 3000, so as to give the whole sharks captured at not less than 40,000 a year. The Great Basking Shark, or Mhor, is always harpooned: it is found floating or asleep near the surface of the water; it is then stuck with a harpoon of the size and form indicated in the annexed woodcut.

The fish, once struck, is allowed to run till tired; it is then pulled in, and beaten with clubs till stunned. A large hook is now hooked into its eyes or nostrils, or wherever it



Line, 600 fathoms.
 Cane shaft, 8 feet.
 Iron shaft, 1 foot 6 inches.
 Barb, 5 inches.

* Dr. Buist's informant wrote from Kurrachee, in Scinde, to Dr. Buist in Bombay; who sent the analysis of the letter to Colonel Sykes; and Dr. Buist added the export of sharks' fins from Bombay.—W. H. S.

can be got most easily attached, and by this the shark is towed on shore; several boats are requisite for towing. The Mhor is often 40, sometimes 60 feet in length; the mouth is occasionally 4 feet wide.

All other varieties of shark are caught in nets, in somewhat like the way in which herrings are caught at home. The net is made of strong English whip-cord; the meshes about six inches; they are generally 6 feet wide, and from 600 to 800 fathoms, or from three-quarters to nearly a mile, in length. On the one side are floats of wood about 4 feet in length, at intervals of 6 feet; on the other, pieces of stone. The nets are sunk in deep water, from 80 to 150 feet, well out at sea. They are put in one day and taken out the next; so that they are down two or three times a week, according to the state of the weather and success of the fishing. The lesser sharks are commonly found dead, the larger ones much exhausted. On being taken home, the back fins, the only ones used, are cut off, and dried on the sands in the sun; the flesh is cut off in long strips, and salted for food; the liver is taken out, and boiled down for oil; the head, bones and intestines left on the shore to rot, or thrown into the sea, where numberless little sharks are generally on the watch to eat up the remains of their kindred.

The fishermen themselves are only concerned in the capture of the Sharks. So soon as they are landed, they are purchased up by Banians, on whose account all the other operations are performed. The Banians collect them in quantities, and transmit them to agents in Bombay, by whom they are sold for shipment to China.

Not only are the fins of all the ordinary varieties of Shark prepared for the market, but those of the Saw-fish, of the Cat-fish, and of some varieties of Ray or Skate: the latter indeed acquires almost the size, aspect, and the form of the shark. The Cat-fish, known here by the same name as at home, has a head very like that of its European congener, from which it differs in all other respects most remarkably. The skin is of a tawny yellowish-brown, shading from dark brown on the back to dirty yellow on the belly. It is beautifully covered all over with spots of the shape and size of those of the leopard, similarly arranged.

The fishermen along these coasts are divided into four great castes, over each of which a head man or Jemadar presides: 1. Koolies; 2. Bundarries; 3. Sarras; 4. —. One great Jemadar, or chief, rules supreme in the craft over all these fisher castes. Our informers at Kurrachee were a chief of one of the castes and his brother, two of the finest men I ever saw. They were 6 feet 3 inches each, properly made, and muscular in proportion, but not overgrown. They had brown beards, long black hair and bushy eyebrows, with fine white teeth, a singular openness of countenance and pleasingness of expression. They seemed greatly flattered by our inquiries, and most willing to give information on every point but one, that of the amount of sharks caught. They were quite delighted with the sketches I made of their boats and implements.

Sharks' Fins exported from Bombay, chiefly to China, 1845-46.

Weight, 8771 cwt. 50 lbs. Value, 182,316 rupees.

The following are some of the entries of imports of sharks' fins into Bombay in 1845-46 :—

| | Weight. | | Value. |
|-----------------------|---------|------|---------|
| | cwts. | lbs. | rupees. |
| African Coast | 104 | 28 | 2,118 |
| Arabian Gulf..... | 1493 | 98 | 30,786 |
| Malabar | 554 | 76 | 10,757 |
| Cutch and Scinde..... | 1149 | 98 | 25,076 |
| Kurrachee..... | 589 | 81 | 13,096 |
| Konkan..... | 692 | 44 | 14,118 |

2. DESCRIPTION OF A NEW CRUSTACEAN.

By W. BAIRD, M.D., F.L.S. ETC.

CYPRIDINA ZEALANDICA. (Annulosa, Pl. XVII.)

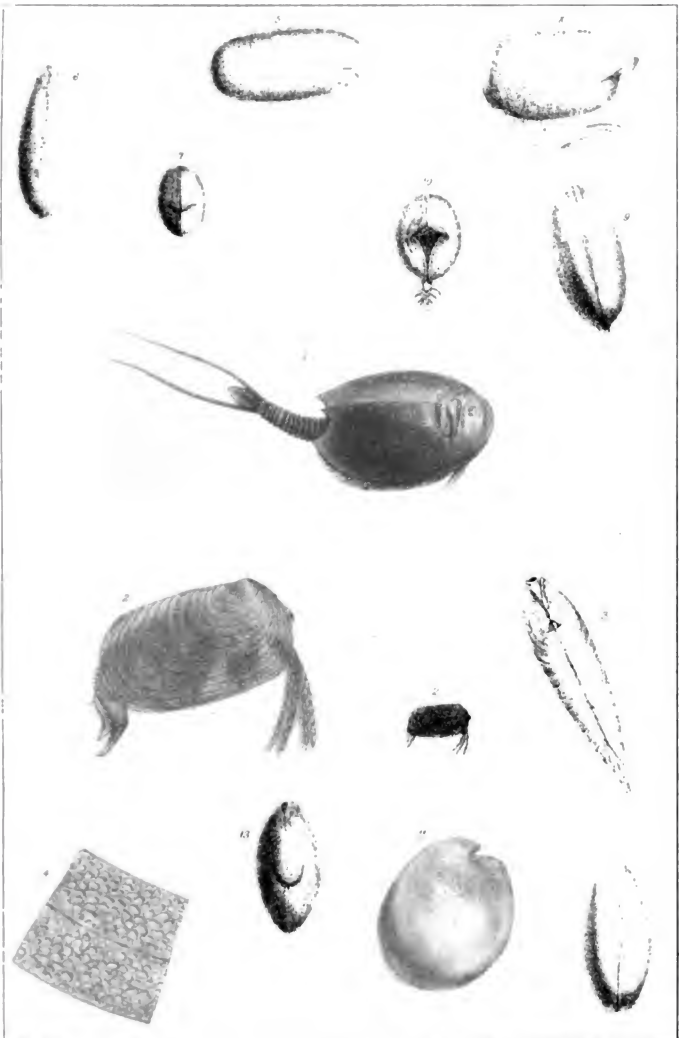
The valves of the carapace are of an oval form, somewhat flattened, but convex in the centre, and concentrically striated. The striæ are numerous, close-set, and of a waved appearance. The surface of the valves is covered with minute punctations, which probably give origin in the fresh state to short hairs, though they are not visible in the dried specimens. The anterior extremity is slightly narrower than the posterior. The whole carapace is of a uniform white colour. The natural size is about one-fourth of an inch in length and one-fifth of an inch in breadth.

Two specimens were sent to the British Museum by the Rev. R. Taylor of Waimati, New Zealand, along with a collection of marine and freshwater shells, but without any history attached to them.

3. CONTRIBUTIONS TO THE ANATOMY OF THE TAPIR.

By H. N. TURNER, JUN.

A young American Tapir having unfortunately died in the Society's establishment, I have been enabled, through the kindness of Mr. Mitchell, to make some interesting observations on the structure of that animal; and I now propose to notice a few points, which I believe to be hitherto unrecorded, calling attention at the same time to certain interesting resemblances, both external and internal, existing between this form and those to which the more philosophic principles of modern zoology have proved that it is most nearly allied. Perhaps I may be permitted to recall the fact, that it was through the preference formerly given to those accounts which assigned to the Tapir a complex stomach, that Cuvier was led to abandon that method of subdividing the Ungulata, which Professor Owen has since shown to be the true one, and which, in the paper that I last had the honour to communicate, I have endeavoured still further to support. It is very possible that Cuvier, had *no* accounts of the anatomy of the Tapir been extant, might have followed up and established his original idea; for on external examination alone, characters fully suf-



W. H. Dall et al. 1914

Ford & West, Lithographers 64 Nassau Garden

1 LEPIDURUS VIRIDIS 2,3,4 ESTHERIA DAHALACENSIS
5 6, 7 CYPRIDINA MARLE 8,9,10. CYPRIDINA INTERPUNCTA
11,12,13. CYPRIDINA ZEALANDICA

ficient are presented to indicate the group to which it should be referred. The fore-foot, although from its having four toes it is apparently an exception to the *Perissodactyle* type, yet shows at a glance that the medius is the digit on which the body most immediately rests, instead of its being supported equally upon that and the annularis, which is the constantly prevailing character in the even-toed division. In the Tapir the annularis shares with the index a secondary part in the function of support; and the little finger seems quite pushed aside, so that its presence is no more a true exception than is the absence of the corresponding toe in the hind-foot of the Peccary, where the even number is destroyed by being reduced to three. As in the other *Perissodactyla*, the Tapir has the prepuce short and wide, not reaching, as in the *Artiodactyla*, to the middle of the abdomen; and the penis (which is described by Professor Owen) resembles that of the Horse in being short, thick, and truncated. Another interesting external resemblance to the Horse is the elevated crest upon the neck, remarked upon by naturalists for its greater development in this, the common species, as a point of distinction from that discovered by M. Roulin in the mountainous districts of their habitat. This appendage, which adds greatly, in our domestic animal, to his characteristic majesty of form, has precisely the same structure in the Tapir, presenting, when cut into, the same hard fibrous substance well interspersed with fat.

With regard to the organs of digestion, I have scarcely anything to add to the observations already published. The small intestines in this specimen were about 12 yards long; and the fine villi, which clothe their internal surface, were, in the duodenal portion, tipped with a dark pigment. The cæcum was more than a foot long, and the fold of the colon 2 feet; the cæcum contained, like the stomach, large quantities of undigested food, while in the small intestines was little else but fluid chyle. The salivary organs, as usual in the *Ungulata*, are very largely developed; the parotids being of great extent, joining each other beneath, in front of the neck, and reaching up on each side to surround the base of the auricle. The molar glands, situated between the buccinator muscle and the mucous lining of the mouth, form a conglomerate mass, opening between two elevated ridges by a series of pores.

The generative organs, internally as well as externally, present a general conformity to the type usual in the *Perissodactyla*; but as the individual was young, it is perhaps as well to defer the publication of any details until they can be confirmed by the dissection of a fully-developed specimen.

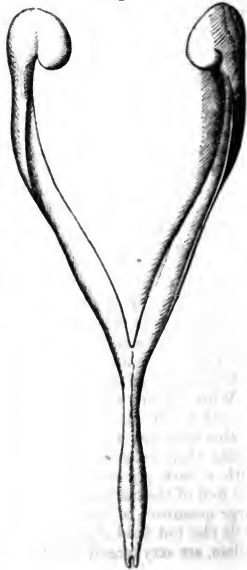
A remarkable anatomical character, which I find the Tapir to possess in common with the Horse, is the singular membranous sac communicating with the Eustachian tube*. It is placed beneath the ear, between the stylohyal bone and the base of the sphenoid, and is of an irregular form, being accommodated to the parts adjacent; the tube itself runs as a groove along part of the upper surface of the sac, and opens into the posterior nares.

* They are called "guttural pouches" by veterinary anatomists.

Nasal bones and cartilages of the American Tapir.

The dissection of the proboscis has afforded some points of interest. A brief description of its general structure, derived only from the dissection of a fetus, is given by Cuvier in the '*Leçons d'Anatomie Comparée*,' but some remarkable details seem not as yet to have been noticed. The deep notch on each side of the base of the projecting nasal bones, which forms so striking a characteristic in the skull, may be very readily, and probably always has been, presumed to be intended for muscular attachment; but its real office is to lodge the posterior termination of the lateral cartilage of the nose. These lateral cartilages, arising from that of the septum immediately beneath the ossa nasi, proceed outwards as usual, but the edge curls inwards, forming one entire convolution, of which the outer part forms posteriorly a flattened tube with a blind extremity, curved upwards, and its termination lodged in the notch alluded to. From the edge, which is of course concealed, a thickened linear prominence is continued upwards within the commencement of the blind tube, but, instead of following its curve, terminates in a rounded extremity. There is no trace whatever of the alar cartilages, the remainder of the proboscis being entirely of a soft substance. With the addition of the pair of

Fig. 1.



Superior aspect.

Fig. 2.



Lateral aspect.—A portion of the outer wall of the cartilage cut away to show the internal convolution.

special levator muscles, noticed both by Cuvier and by Professor Owen, in the possession of which the Tapir again resembles the Horse, the muscles of this organ are arranged upon the usual type. Their fibres radiate from a point just before the eye, some running backwards to form the orbicularis palpebrarum; others spreading upwards to the top of the proboscis, forming the compressor nasi; others proceeding downwards and forwards, to constitute the levator labii superioris alæque nasi. The depressor of the proboscis, and the orbicularis oris, are well developed, the latter muscle being very thick, especially in the under lip.

I have yet seen nothing to shake my opinion, that the structure of the larynx will one day become of great importance to the zoologist, although at present my opportunities have been far from sufficient to enable me to point out which peculiarities in its formation are truly characteristic of certain groups. In this case, therefore, I limit myself to the comparison of it with such as my collection possesses, namely with that of the Horse, as a near ally, and with those of the Peccary and the Sheep, as members of the other great Ungulate division. The os hyoides has the characters usual in the order; its stylohyal pieces agree with those of the Horse in being very narrow at their junction with the lesser cornua, and gradually widening, the reverse being the case in the Peccary and the Sheep. The latter animal, however, like most ruminants, has an intermediate piece at the junction of the stylohyal and the lesser cornu. The Tapir wants the sudden expansion of the upper end of the stylohyal, which is common in the Ungulata, and differs remarkably from the Horse in the small development of the true basihyal, and in the total absence of the strong epihyal process. The thyroid cartilage, however, agrees precisely with that of the Horse in the great obliquity of its alæ, in its median portion being much thickened above, and very deeply emarginated below; the Peccary and the Sheep presenting the reverse of each of these characters. The cricoid and arytenoid cartilages do not present any essential points of difference; but in the Peccary the cricoid is very peculiar in having its anterior part drawn down, so as to encroach upon four of the tracheal rings, and deeply emarginated above. In the interior of the larynx the Tapir has the superior and inferior ligaments well-marked, though not very prominent; the latter, or chordæ vocales, are slight, but sharp, folds in the mucous membrane; the former are thickened anteriorly. Just at the base of the epiglottis is a pair of arched openings, each leading into a small sinus, which extends upwards beneath the base of the epiglottis and inward thickening of the thyroid cartilage, and downwards in front of the anterior attachments of the superior ligaments. The Horse has, like the Tapir, a fossa excavated in the thickened upper part of the thyroid cartilage; and it would appear from Cuvier's remarks (who, however, had but a drawing to inspect), that the Rhinoceros has something similar. The Tapir entirely wants the lateral sacs observable in the Horse.

The muscles of this organ are arranged as usual. The homologues of the sternohyoid and sternothyroid muscles arise, as in some other

animals, from the first pair of ribs and their cartilages; the latter muscles are but narrow. There is no separate stylohyoideus, the digastricus giving some fibres to the os hyoides. The Tapir also possesses the muscle whose fibres (to use the words of Cuvier) fill a portion of the interval of the two cornua of the same side. There is a double pair of thyro-arytenoid muscles, the upper being partly continuous with the transverse arytenoid muscle, and forming a powerful constrictor of the glottis.

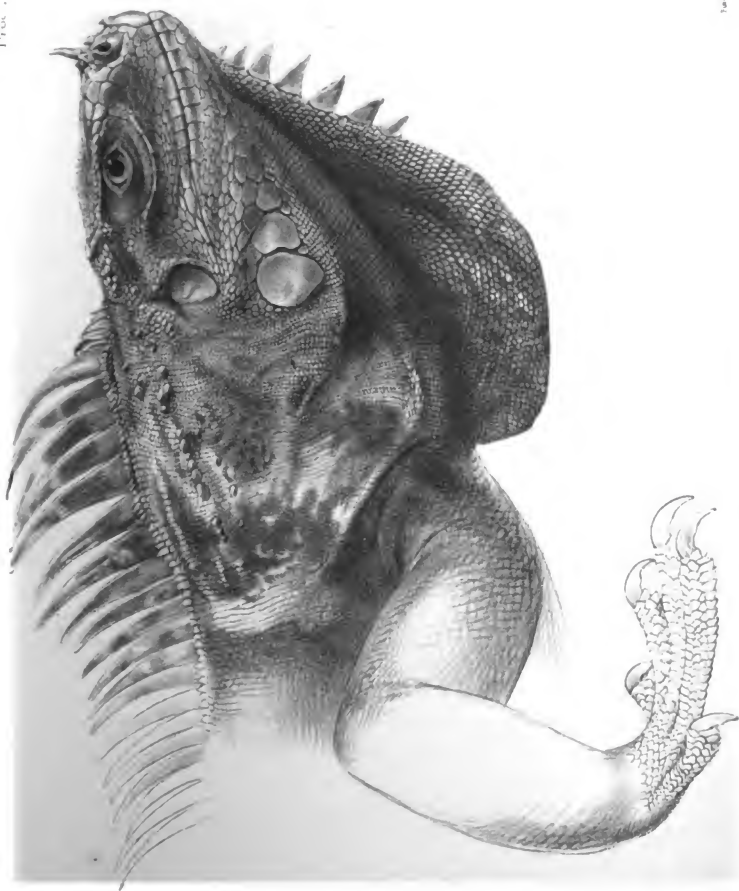
The muscles of the limbs formed also a portion of my investigations; but to point out all their peculiarities would involve the repetition of many that are known to be common to the Ungulata. A peculiar muscle arises near the top of the scapula, and covering the supraspinatus, joins the complex muscle formed by the union of the cleidomastoideus with portions of the trapezius and deltoid, called by the French anatomists "muscle commun de la tête, de l'encolure, et du bras." The levator scapulæ and pectoralis minor are wanting, as in the Horse. The coracobrachialis is a long slender muscle, reaching nearly to the inner condyle of the humerus. The brachialis anticus arises from the whole of the rounded posterior side of the humerus, immediately below its head; it consequently embraces and twists round this bone, to proceed to its usual insertion. The anconeus seems to be wanting, or confounded with the triceps. In the forearm, we find the pronator teres represented by a small bundle of fibres closely adherent to a tendinous ligament, which extends from the inner condyle of the humerus all down the sharp edge of the radius. In the hand, the special muscles of the outer toe are all well-developed. In the posterior extremity, the soleus is wanting, and the tibialis posticus is wanting also. The flexor longus pollicis is here, as in all the lower animals, the principal flexor of the toes, arising principally from the fibula, which is here well-developed, and receiving the small tendon of the flexor longus digitorum, after both have passed the ankle in their usual places.

All the organs were perfectly healthy, but the large veins were full of very dark blood, and considerable clots of fibrine were found, not only in the veins and heart, but even in the aorta. Numerous bruises, received in its journey from Liverpool, disfigured the exterior of the animal, and probably assisted, with the unusual coldness of the weather, in causing its premature demise.

4. ON THE IGUANA OF S^{TA} LUCIA, METOPOCEROS CORNUTUS OF WAGLER. BY LIEUT. TYLER, R.E.

(Reptilia, Pl. III.)

This species attains a length of five, and sometimes even of six feet, the tail being about twice and three-quarters the length of the body. When first hatched it measures four inches. The tail is thick at its commencement, and is so connected with the body that it becomes difficult to define precisely their respective limits. The fore and hind legs are thick and muscular, with five toes on each, armed with strong hooked talons, by any one of which the animal can support



IGUANA RHINOCEROS

itself. Of the fore-legs the third and fourth toes are the longest; and of the hind-legs the fourth toe is of an enormous length, and has five joints. Under the toes the scales form a double row of denticulations. The nostrils are large, oval, and not mobile, and above them are two horns, with five or six tuberculous excrescences between them and the nostrils, and surrounding the horns. The mouth is large, and armed with two rows of maxillary and two of palatal teeth, which appear simply to be intended to crop leaves and to provide the stomach with vegetable food. Each maxillary tooth is a little double-edged saw, and they are so lapped over each other that the reptile, in closing its mouth upon a leaf, cuts through it completely. The tongue is divided at the point, is very wide, and can be extended out of the mouth, although it is fastened to the interior of the lower jaw near its extremity. The tongue is curiously used by the animal to draw food into the mouth, and to forward it down the gullet, or to repel it at will, and the only use of the palatal teeth appears to be to secure the food while the tongue moves forward to afford fresh assistance in its journey down the throat*. Between the lower jaw and the chest is a pouch, which the animal draws in or extends simultaneously with the compression or swelling out of the body when enraged or excited. The portion of the gular pouch attached to the jaw is inflatable, and food is sometimes retained in it for a considerable period, but the lower part is merely extensible. On the anterior part of this pouch or dewlap, and immediately below the jaw, are from five to seven denticulations similar in substance and colour to the dorsal crest, but not so long.

This crest or mane commences behind the head, with three or four excrescences of different sizes, then suddenly becomes, in larger Iguanas, an inch and a half or two inches in length, and runs uninterruptedly down the back and tail, gradually diminishing, excepting above the commencement of the tail, where a slight increase again takes place, until, at the extremity of the tail, it is undistinguishable. The dorsal crest consists of about fifty protuberances, and the caudal crest of about 218, each of the latter becoming gradually harder as they decrease in height, and so altering their shape as to resemble, down the greater part of the tail, the edge of a saw.

The ear is covered by a thin scale, which gives to the touch, but does not seem sensitive. There is no external opening, nor does the sense of hearing appear to be very acute or much used by the animal, who trusts more to the eye to discover both his food and his enemies.

The eye is bright and prominent, and is protected by an inner cuticle as well as the lower eyelid; the upper lid not moving to aid in covering it, but only when the direction of sight is altered in a perpendicular direction. There are soft brows over the eyes of a spherical shape, and projecting above the remainder of the upper part of the head.

The general colour is bright green in the young and dirty grey in the old Iguanas, with about six black streaks across the body and

* The tongue is always covered by a glutinous secretion, which is perceptibly appended to the jaws when the mouth is open.

fifteen across the tail, each streak being darker towards the head, and gradually shaded off towards the tail. These streaks extend over the dorsal and caudal crests, which partake entirely of the variegations of the body in the younger, but, in the older individuals, are tipped with red and yellowish brown at their bases and extremities. These black streaks do not unite under the belly or under the anterior part of the tail, but towards the extremity of the tail they gradually elongate and become more dull, encircling the tail, and at last becoming hardly discernible, mixing with the green or grey into one dull tint.

The dewlap, as well as the folding skin in front of the shoulder, connected with it, is interspersed with black and yellowish brown, of which colours the denticulations of the dewlap also partake. The upper part of the head is of a darker and richer green in the young, fading as the animal advances in years, and becomes weather-beaten, as is the case with the human species, and with all animal and vegetable life. The whole of the under part of the body is of a lighter colour in both old and young. The female has a more delicate colour and general appearance than the male.

Whilst always retaining the same colours, this Iguana has the power of considerably changing his hues, but these changes are gradually performed. The colours become more dull as the period of the change of skin approaches, which is not, however, frequent. Each scale has its own tint, and the colours being thus irregularly blended, an appearance is given, particularly to the younger reptiles, very much like that of worsted-work. The colour of the eye is dark brown, the pupil being surrounded by a golden rim.

Every part of this curious reptile is covered with scales, and these are of every variety of shape and size. Those on the top of the head are large, smooth, and unequal; between them and the mouth runs a row of smaller scales, while the mouth itself is surrounded, both in the upper and lower jaw, by large scales terminated at the extremity between the nostrils, by one large brownish and softer scale in the upper jaw, and a similar though smaller scale meeting it in the lower jaw. From this latter, and below those immediately surrounding the mouth, is a range of scales or rather plates, each larger than its predecessor, terminated on either side by a very large plate under the auricle. Below this row of scales is the gular pouch (Fanon) covered by small, smooth scales. The eye is protected above by small, smooth, unequal scales, which also form part of the covering of the top of the head. The scales of the lower eyelid are peculiarly small and delicate; and a row of semispherical scales, resembling somewhat a string of small pearls on each lid, surrounds the eye. At the back of the head the scales become tuberculous, and a few on each side of the neck assume a pyramidal or rather a conical form. The scales of the neck and back are almost circular, but nearer the tail they become rhomboidal and carinated, their posterior points elongating, and their centres projecting more and more, both above and below, as they reach the extremity of the tail, so as to give it the form of a many-edged saw, the most severe edge being that presented by the caudal crest. The scales above the fore-legs are equal, carinated, and imbricated,

assuming, at the foot and along the toes, a convex and smooth appearance. Under the fore-legs they are smaller, and peculiarly so at the joints and under the feet; the most delicate, however, are those under the leg, and connecting it with the body. The hind-legs are similarly clothed to the fore-legs, excepting that they are provided with a single row of femoral pores, fourteen or fifteen in number, and which increase in size with the growth of the reptile. These pores are large and fully developed in the male, but small and sometimes even hardly perceptible in the female.

The scales of the belly are very different from those of the back, being larger, equal, and carinated, although generally worn almost smooth in the old individuals. They are divided by a distinct line from the termination of the dewlap to the vent.

The Iguanas live principally in trees, and near the windward coast of the island. They are not much seen excepting in the months of February, March, and April, when they quit their hiding-places, and repair to the sea-shore or other sandy places to lay their eggs in the sand. The older females lay a great number of eggs; I have known an instance of one in confinement laying five in one day; and thirty-two, within the space of ten minutes, five days afterwards, making thirty-seven in all. I have taken the eggs from the bellies of small females in less numbers, such as eight, fourteen, and seventeen. They are not found in successive stages of advancement as in the hen, the tortoise, and many other animals, but all of the same size, and arrived at the same degree of maturity. Nor are the eggs always disposed, as I have seen it stated, in two rows, one on each side of the belly of the female. When very small, they are arranged in a long irregular cluster, closely packed together, and they seem to retain the same relative position as they increase in size. The eggs are very liable to destruction from ants, which fact probably accounts for their being usually deposited in sea sand. They are also hunted for and eaten by the *Pilori* (*Mus pilorides*), or "Rat Musqué," and by a bird called the "Trembler." They are soft and without any white, and their shell resembles the most beautiful kid used for French gloves, of a very light straw-colour. They are about the size of those of a pigeon, but rather longer; they vary however in dimensions, according to the age and size of the Iguana.

This Iguana is not averse to water, when not too cold, taking to it only when the sun is shining; in fact, not moving about much at any other time. Its mode of swimming differs from that of other lizards, inasmuch as it places its four legs close by the side of its body, and swims entirely with its tail. It dives with great facility, and remains sometimes for a considerable time under water. I believe that the Iguana never ventures into the sea. The tail is a very valuable limb; for besides being the sole means of swimming possessed by the animal, it is of great use in climbing trees, although not prehensile; and it is a most important weapon of defence, a blow from it being frequently sufficient to inflict a severe wound. In fact, this reptile is rather formidable when brought to bay in the woods. It is hunted

by the natives with dogs trained for the purpose. The dog immediately upon scenting it gives tongue, and if on the ground, the dog seizes it by the back, and either kills it or maims it, which makes its capture easy; if in a tree, the Iguana is either shaken down, a matter ordinarily of no small difficulty, or the branch is cut off. It is almost useless to attempt to find these reptiles without dogs, as the resemblance of their colour to that of the trees they inhabit prevents them from being easily seen. Few dogs but those accustomed to the sport will touch them, as, in addition to the blows which they inflict with their tails, they bite and scratch furiously; and when once they lay hold of anything with their teeth, they can only be made to let go by an inducement to bite, some other attractive object being offered to them. They run into holes when chased, if an opportunity offers, and when their eyes are hidden from view, they fancy that their whole body is safely covered. The flesh, particularly of the female, is a great delicacy; it is cooked in various ways, sometimes in a fricassee, with the eggs whole, sometimes roasted or stewed. The eggs have a very glutinous taste. The flesh is said to disagree with some constitutions, although it does not, I believe, as has been asserted, disagree peculiarly with those persons who have been affected with venereal diseases.

This Iguana is said by some of the natives to eat lizards and insects, but I have opened several, and I have never succeeded in finding any but vegetable matter in the stomach, sometimes, however, covered with innumerable small worms, the eggs of which must doubtless have been swallowed with the leaves, fruit, or bark of trees, upon which, I conceive, it feeds entirely.

Unless caught young, it is very difficult to induce these reptiles to feed in confinement, and particularly when watched. Their disposition is sulky and savage, and I have known some of them die in confinement from starvation rather than feed. This has caused me to try the following plan, which I find very successful, of affording them nourishment. I hold them by the lower part of the body with one hand, and with the other I irritate them, until they open their mouths and attempt to bite, when I insert food; and by annoying them in this way, I have not only made them eat their natural food, but I have killed some of them by forcing them to eat corn, and leaves which appear to have disagreed with them.

This Iguana has a small rounded heart, reddish lungs, an oblong gall-bladder, a large dark-coloured flat liver, and a white, and very extensible oblong stomach.

June 11, 1850.

W. Spence, Esq., F.R.S., in the Chair.

The following papers were read :—

1. **SYNOPSIS OF THE SPECIES OF ANTELOPES AND STREPSICERES, WITH DESCRIPTIONS OF SOME NEW SPECIES.** BY J. E. GRAY, Esq., F.R.S., P.B.S. ETC.

(Mammalia, Pl. XX.)

The genera in this Synopsis are arranged after the plan, first suggested in a paper on the genera of the Hollow-horned Ruminants (*Boridæ*) in the 'Annals and Mag. of Nat. Hist.' xviii. 227.

ANTELOPES.

The Antelopes contain a large number of species separated into several genera, which may be arranged in the following sections :—

I. The ANTELOPES OF THE FIELDS have a tapering nose, with the nostrils bald within.

1. The *True Antelopes* are light-bodied and limbed, and small-hoofed, with a short or moderate tail covered with elongated hair to the base ; horns lyrate or conical.

2. The *Cervine Antelopes* are large-sized, rather heavy-bodied and large-hoofed, and have an elongated tail with short hair at the base and tufted at the end ; horns lyrate or conical. (See p. 128.)

3. The *Caprine Antelopes* are heavy-bodied and limbed, and large-hoofed, with a very short, depressed tail covered with hair to the base ; horns conical. (See p. 135.)

II. The ANTELOPES OF THE SANDY DESERTS have a broad nose, and the nostrils lined with bristles within.

4. The *Equine Antelopes* have the nose very broad, soft, spongy, and bristly. (See p. 138.)

5. The *Bovine Antelopes* have the nose moderately broad, with a black, moist muffle. (See p. 139.)

I. The ANTELOPES OF THE FIELDS. Nose tapering, the nostrils bald within, close together in front and diverging behind.

1. The **TRUE ANTELOPES.** Body moderate-sized, elegant ; legs slender ; tail moderately elongate, hairy ; horns placed over the eyebrows.

A. *Horns lyrate* (or rarely cylindrical, subspiral), strongly ringed at the base; nose orine, without any naked muffle; deep inguinal pouches; and tear-bag generally well-developed.

1. SAIGA.

Horns short, strong, annulated, lyrate, white; nose very high, compressed, rounded; nostrils very close together; tear-bag distinct; fur soft.

1. SAIGA TATARICA. The COLUS or SAIGA.

Pale yellowish, crown and back greyish washed; belly and anal region beneath the tail white; young, crown greyer.

Capra Tatarica, Linn. S. N. 97.—*Antilope Saiga*, Pallas.—*Ibex imberbis*, Gmelin.—*Antilope Colus*, H. Smith.—*Colus Strabonis*, Gesner.—*Colus Tartarica*, Wagner.—*Cervicapra*, sp. Blainv.—*Saiga tatarica*, Gray, Knowsley Menag. 3.

Inhabits Siberia. Cab. Brit. Mus.

2. KEMAS.

Horns elongated, rather lyrate; nose with a dilated pouch on each side; tear-bag distinct? hair close, erect, spreading; nose-hole of skull very large; females hornless.

1. KEMAS HODGSONII. The CHIRU.

Pale brown; chest, belly and inside of the limbs white; front of face and front of legs blackish.

Antilope Hodgsonii, Abel.—*A. Kemas*, H. Smith (not horns, t. 181. f. 6).—*A. Chiru*, Lesson.—*Kemas Hodgsonii*, Gray, Knowsley Menag. 3.

Inhabits Thibet. Cab. Brit. Mus.

3. GAZELLA, H. Smith.

Horns strong, lyrate, black; face tapering; nose simple; tear-bag distinct; fur short, close-pressed. Females with smaller horns; teats four.

* *Knees with tufts; back and rump brown, vent white.*

† *Lower part of side with a dark oblique streak; feet with a tuft of black hair beneath.*

1. GAZELLA DORCAS. The GAZELLE.

Fur rather elongate and harsh, grey brown; outside of fore legs, broad oblique streak along the side, edge of anal disc, front of face and face-streak, dark brown; face-streak, throat, chest, belly, inside of thigh and anal disc, white; tuft at under side of feet and end of tail black; knee-tufts blackish; young, back and side-streak rather paler.

Capra Dorcas, Linn.—*Antilope Dorcas*, Pallas; Licht. 3. t. 5.—*A. Gazella*, Pallas.—*Gazella Kevella*, H. Smith, ♀.—*G. Corinna*, H. Smith, ♀.—*Gazelle*, Buffon, H. N. xii. t. 22–25. ♂.—*Kevel*, Buffon, H. N. xii. t. 26. ♂. not F. Cuvier.—*Corinne*, Buffon, H. N. xii. t. 27. ♀. t. 30 (not F. Cuvier); Cuvier, Menag. Mus. t. —*Kevel gris*, F. Cuvier, Mam. Lithog. t. 3.—*Antilope Cora*, H. Smith.—

A. Arabica, Hemprich and Ehrenb. Symb. Phys. t. 5 ; Licht. Saugth. t. 6.—*A. Cuvieri*, Ogilby, Proc. Zool. Soc. 1840, 35 ; Frazer, Zool. Typica, t.

Var. Nose with a dark spot or streak.

Var. Larger, legs thicker.

Gazella Dorcas, var. Gray, Knowsley Menag. t. 3.

Inhabits N. Africa ; shore of Red Sea ; Mogador (*Willshire*).

The Earl of Derby has specimens which he calls *Gazella vera*, figured *Knowsley Menag.* t. 3 ; they are rather larger, greyer, and the legs are much thicker and heavier than the specimens from the shore of the Red Sea. The fur is similar, but not quite so long on the under side of the neck. The *Kevel gris* (F. Cuvier, Mam. Lith.) well represents this variety.

The *A. Cuvieri* of Ogilby, from Morocco, is a much larger animal than the common *G. Dorcas*, but agrees with it in other characters, except, it is said, in having longer ears.

M. F. Cuvier (Mam. Lithog. vii. t. 8. ♀.) has figured and described an Antelope from Sennaar under the name *A. leptoceros*, which he says is very like *A. Dorcas*, but has larger horns, those of the males being twice and of the females half as long again as the head. The horns vary greatly in length in our specimens.

†† *Upper part of sides with a pale streak.*

2. GAZELLA ISABELLA. The ISABELLA GAZELLE.

Fur short, very soft ; pale yellowish brown, with a broad, rather paler oblique streak on the upper part of the side ; knee-tufts, front of face and lower face-streak, darker yellow brown ; upper face-streak, chest, back edge of tarsus, under side of feet, inside of limbs, belly and vent, white ; tail black. Female, horns very slender, longer than the head. Young, paler, the lower part of the sides rather darker.

Gazella Isabella, Gray, Ann. and Mag. Nat. Hist. 1846.—*Antelope Iridis* (*Die Iris Antelope*), Licht.—*A. Dorcas*, Licht. Darstell. t. 5.—*A. Dorcas*, var. *a.* Sundevall.

Inhabits N. Africa ; Egypt (*J. Burton, Esq.*), Kordofan (*Sunder.*).

This species is easily known from the foregoing by the softness and fineness of the fur, and the lower side-streak being of the same colour as the back, and from it and the following by having no dark edge to the anal disc.

3. GAZELLA SUBGUTTUROSA. The JAIRON.

Pale brown ; upper part of sides with a broad, rather paler streak ; crown and knee-tufts greyer ; face-streak indistinct ; nose, lower part of sides, belly, hinder side of fore and front side of hinder limbs and anal disc white ; streak on haunches dark brown ; end of tail blackish.

Antelope subgutturosa, Guldenst. ; Pallas ; H. Smith, Griff. A. K. t. 183. f. 5, horns.—*Capra Ahu*, Kæmp.—*A. Dorcas*, var. *persica*, Rüppell.—*Gazella subgutturosa*, Gray, K. Men. 4.

Inhabits Tartary, Armenia and North Persia. Cab. Brit. Mus.

Larger than the Chikara.

NO. CCVIII.—PROCEEDINGS OF THE ZOOLOGICAL SOCIETY.

*** *Knees with tufts; rump mark and throat-spots white: no dark side-streak; tail slender, compressed, only hairy above* (*Dama*, Bennett).

4. GAZELLA SOEMMERINGII. The ABYSSINIAN MOHR.

Pale brown; nose, forehead and lower edge of face-streak and end of tail blackish; chest and belly, angular mark on rump above the tail, face-streak and spot on the throat white; limbs pale. Female, forehead paler in the centre.

Antilope Soemmeringii, Cretzschm. in Rüppell, Zool. Atlas, t. 19 ♂.

—*Gazella Soemmeringii*, Gray, K. M. 5.

Inhabits Lower Abyssinia; Sennaar. Brit. Mus.

5. GAZELLA MOHR. The MOHR.

Bay; chin, spot on throat, chest, belly, edge and inside of limbs and angular spot on rump above the tail white; spot on side of face and end of tail black.

Antilope Mohr, Bennett, Trans. Zool. Soc. i. t. 8; Knight, M. A. N. f. —*A. Dama*, var. *occidentalis*, Sundevall. —*Gazella Mohr*, Gray, K. M. 5.

Inhabits Morocco. Mus. Zool. Soc. Portendic. There called *Seni-ci* (*Mr. Whitfield*). Mus. Brit.

The specimen in the Frankfort Museum, which was received from the Zoological Society, is one-third smaller than the *Andra*. It is brown, rump mark, lower part of the sides, belly, inside and edge of legs white, face iron-grey with longer hair at the base of the horns; horns large, thick, the face-streak indistinct from the pale colour of the head.

There is a fine specimen of this species living at Knowsley, and a female which died on the passage in the British Museum.

6. GAZELLA DAMA. The NANGEUR.

Bay; chin, spot on throat, belly, lower part of sides and hinder part of the back, inside of the limbs white; no spot on side of the face.

Antilope Dama, Pallas. —*Gazella Dama*, Gray, K. M. 5. —*A. rubra*, Afzelius. —*Nangeur*, Buffon, H. N. xii. t. 32. f. 3. t. 34.

Inhabits W. Africa; Senegal.

Not seen since Buffon's time; may be a bad figure of the former.

7. GAZELLA RUFICOLLIS. The ANDRA.

Whitish; neck and front part of the middle of the back reddish; no face-streak.

Antilope ruficollis, H. Smith, G. A. K. v. 205. —*A. Andra*, Bennett. —*A. Dama*, Licht. Saugth. t. 3, 4; Rüppell, Zool. Atlas, t. 14, 16; Ehrenberg, Symb. Phys. t. 6. —*A. Dama*, var. *orientalis*, Sundevall. —*Gazella ruficollis*, Gray, K. M. 5.

Var. Young? with an indistinct narrow brown streak across the outside of the thighs, and the forehead iron-grey, with longer hair at the base of the horns; horns small. Mus. Frankfort.

Inhabits North Africa; Kordofan. Brit. Mus. ♀.

These species differ in size as well as markings. The *Mohr* and *Andra* differ from *G. Soemmeringii* in being of much larger size, and in wanting the black face and streaks. Bennett's *Mohr* has only an angular white spot on the rump, like *G. Soemmeringii*; Buffon's *Nangeur* is smaller, and has more white on the rump, thighs and sides; and the *Andra*, which agrees with the figures cited, is almost all white, with a reddish neck and withers.

**** *Knees without tufts (but with rather longer hair, forming a linear keel in front); back and rump brown; sides with dark streak.*

8. GAZELLA RUFIFRONS. The KORIN.

Bay brown; sides above paler, with broad dark streak below; tail black; chest, belly, inside of legs, back edge of tarsus, and under side of feet and anal disc white; face bright bay, side-streak broad white. *Gazella rufifrons*, Gray, Ann. and Mag. Nat. Hist.—*Kevel*, male, F. Cuvier, Mam. Lithog. t. 3.—*Corine*, F. Cuvier, Mam. Lithog. t. . young ♀.—*A. levipes*, Sundevall.—*Gazella rufifrons*, Gray, K. M. 5. t. 4.

Var. Nose blackish above (adult ♀).

Young; pale yellowish, side-streak brownish.

Inhabits W. Africa; Senegal. Mus. Paris. Gambia (*Mr. Whitfield*), called *Seni*. Brit. Mus. Sennaar (*Sundevall*).

Buffon mentions a *Corine* as coming from Senegal, but he says it is smaller than the *Kevel*, and Daubenton says that it has knee-tufts, so that it cannot be this species. Indeed the *Gazelle*, *Corine* and *Kevel* of Buffon are clearly all *A. Dorcas* of this memoir.

The *Kevel* figured by M. F. Cuvier well represents this species. He says it was sent from Senegal, and probably it has not knee-tufts, for they are not indicated in the figure or mentioned in the text; for, like other descriptions of this author, though it occupies more than two pages, all the peculiarities of the species are left out. The *Corine* of the same author, also from Senegal, well represents the young. M. F. Cuvier says the *Kevel* and *Corine* and *A. Dorcas* form one species, but afterwards, under *Kevel gris*, he thinks they may be two.

4. PROCAPRA, Hodgson.

Horns strong, elongate, lyrate, black; face tapering, nose simple; tear-bag none; knee-tufts none; tail very short: female hornless; teats two. Asia; not gregarious.

1. PROCAPRA GUTTUROSA. The DSEREN.

Pale yellowish; hair long, soft, of anal region short, white; tail black.

Antilope gutturosa, Pallas, Spic. xii. 45. t. 2; H. Smith.—*Gazella gutturosa*, Gray, Knows. Menag. 3.

Inhabits Mongolia, Siberia. Cab. Brit. Mus., male and female. Thibet. Mus. Ind. Comp.

2. *PROCAPRA PICTICAUDA*. The RAGOA or GOA.

Hair sordid, brown with pale rufous tips; under side, inside of ears, limbs and anal disc, reddish white; tail black.

Procapra picticauda, Hodgson, J. A. S. Bengal, 1846, 173. 334. t.

Inhabits Thibet; in the plains. Brit. Mus., skulls. Perhaps same as former in summer fur.

5. *TRAGOPS*, Hodgson.

Horns lyrate, short, black; face tapering, nose simple; "tear-bag none;" teats two: females with small horns. India; not gregarious.

1. *TRAGOPS BENNETTII*. The CHIKARA.

Bay brown; sides uniformly coloured; knee-tufts, end of nose and tail black; streak on haunches blackish; face-streak, chest, belly and inside of limbs white.

Antelope Bennettii, Sykes.—*A. Christii*, Gray.—*A. Bharatensis*, Hodgson.—*A. Hazena*, I. Geoff., Voy. Jacq. Mam. t. 6, bad?—*A. Dorcas*, var. E., Sundevall.—*Tragops Bennettii*, Hodgson, 1847.

Inhabits India. Cab. Brit. Mus.

The feet are generally blackish, but sometimes brown like the back.

6. *ANTIDORCAS*, Sundevall.

Horns lyrate, short, black; face tapering, nose simple; tear-bag not remarkably distinct; back with an expansile white streak or fold; hair close-pressed; knees not tufted: females with small horns.

1. *ANTIDORCAS EUCHORE*. The SPRINGBOC or TSEBE.

Pale brown; face, throat, chest, belly, broad expansile streak on back to base of tail, edge and inner side of limbs white; face-streak and middle part of forehead pale brown, side-streak oblique, dark brown: young paler; side-streak paler, back-streak distinct.

Antelope Euchore, Forster, Licht. t. 7; H. Smith; Harris, W. A. A. t. 3.—*A. saltatrix*, Link.—*A. marsupialis*, Zimm.—*A. Pygarga*, Blumenb.—*A. dorsata* and *A. saliens*, Lacep.—*A. Ibez*, Afzelius, 1810.—*Gazella Euchore*, Gray, Know. Men. 6.

Inhabits S. Africa. Brit. Mus.

7. *ÆPYCEROS*, Sundev. MSS.; *Antelope*, Gray.

Horns elongate, wide-spreading, lyrate, black; face tapering, nose simple; knees not tufted, feet with tuft of (black) hair near pastern; teats two; no trace of suborbital sinus (*Harris*).

1. *ÆPYCEROS MELAMPUS*. The PALLAH or ROOYE BOG.

Bay, sides paler beneath; belly, anal disc and lower side of tail white; crown, anal streak and tip of tail blackish; tuft above feet and back of feet black.

Antelope Melampus, Licht.; H. Smith, t. 181. f. 7; Harris, W. A. Africa, t. 15.

Inhabits S. Africa. Brit. Mus.

8. ANTILOPE, H. Smith; *Cervicapra*, Gray.

Horns elongate, subspiral, erect, diverging; face tapering, nose simple; tear-bag large. India; gregarious.

1. ANTILOPE BEZOARTICA. The ANTELOPE.

Grey brown; lips, orbits, chest, lower part of sides and belly, edge and inside of limbs white; nose, front of shoulder and outside of thigh, end of tail and front of feet blackish; neck redder.

Capra bezoartica, Aldrov.—*C. Cervicapra*, Linn., ? H. Smith.—*A. Cervicapra*, Pallas, Gray, Illust. Ind. Zool. t. .—*Antilope*, F. Cuv. Mam. Lith. t. . ♀.—*Cervicapra bezoartica*, Gray, Knowsley Men. 6.

Var. and young. A narrow pale streak on the upper part of each side.

Antilope bilineata, Temm., Gray, Illust. Ind. Zool. t. .

Inhabits India. Brit. Mus.

- B. *Horns small, slender, straight, conical, tapering, more or less diverging and often bent forward at the tip; the muffle is generally large and moist.*

† *Tear-bag large; muffle generally large.*

9. TETRACERUS, Leach.

Muffle large; tear-bag large, longitudinal; horns, two pair very short, conical, straight; knee-tufts none: female hornless.

1. TETRACERUS QUADRICORNIS. The CHOUKA.

Front pair of horns conical, distinct.

T. quadricornis, H. Smith, G. A. K. t. 181. f. 3. t. 186.—*Antilope quadricornis*, Blainv.—*A. striaticornis*, Leach.—*A. tetracornis*, Hodgson.—*A. Chickara*, Hardw.; H. Smith.—*T. Chicara*, F. Cuv. Mam. t. . ♂.—*Cervus albipes*, F. Cuv. Mam. Lith. t. . female.

Inhabits India, Himalaya. Brit. Mus. Thibet. Mus. Ind. Comp.

M. De Blainville in describing this animal has read *Moorshadabad*, the habitat, for *Hoornadabad*, and thought it the name of the animal.

2. TETRACERUS SUBQUADRICORNUTUS. The JUNGLIBUKRA.

Front pair of horns rudimentary, tubercular; hinder horns conical, subcylindrical; pale brown; side rather paler; chest, belly, inside and front of legs whitish; feet paler, varied.

Var. Female, front of legs blackish.

Antilope subquadricornutus, Elliot, Madras Journ. 35. t. 4. f. 2.—*Brown Antelope*, Sykes.

Inhabits Madras. Brit. Mus. Larger than the former.

Mr. Hodgson, in MacClelland's Calcutta Journ. Nat. Hist. 1847, notices and figures five species of this genus: 1. *T. Iodes* (rusty-red), t. 4. f. 3, and 2. *T. paccerois* (full-horned), t. 4. f. 1, 2, from skull.

10. CALOTRAGUS, (part) Sundevall; *Oreotragus*, (part) Gray; *Redunca*, (part) H. Smith; *Tragulus*, H. Smith; *Cervicapra*, sp. Blainv.

Muffle large; tear-bag arched, transverse; horns subulate, elongate, erect; hoofs triangular, flattish beneath, acute in front; crown smooth; tail very short; groin and orbit nakedish; females hornless; teats four; the knees not tufted; inguinal pore none; ear elongate; false hoof small or none.

* *False hoofs none.*

1. CALOTRAGUS TRAGULUS. The STEINBOC.

Fulvous, ashy; hair uniform; small spot on nose, and two diverging streaks on crown to nape blacker; upper part of throat, chest and abdomen white; ears three-fourths the length of the head; false hoofs none.

Antelope Tragulus, Forster, Licht. t. 14.—*A. rupestris*, H. Smith; Harris, W. A. A. t. 25. f. 2.—*A. campestris*, Thunb. 1811; Afzelius, 1815.—*A. pallida*, H. Smith.—*A. Pediotragus*, Afzelius.—*A. fulvorangea*, Desmoul.—*A. rufescens*, H. Smith, G. A. K. t. 188.—*Calotragus tragulus*, Gray, Knowsley Menag. 7.

Var. Without the black crown-streaks, throat whiter.

Inhabits S. Africa. Brit. Mus.

This species varies much in colour, perhaps according to the season: sometimes the hairs are whitish at the tip, giving the fur a glaucous appearance; the black streaks are as distinct in the young as in the adult.

** *False hoofs small.*

2. CALOTRAGUS MELANOTIS. The GRYS BOB.

Red bay, with intermixed white hairs, crown with two dark streaks; ears two-thirds the length of head; false hoofs small.

Antelope Melanotis, Thunb. 1811; Afzelius; Licht. S. t. 12; Harris, W. A. A. t. 26.—*A. grisea*, Cuvier, D. S. N. ii. 244, 1816; H. Smith.—*A. rubro-albescens*, Desmoul.—*Calotragus melanotis*, Gray, Knowsley Menag. 7.

Var. *pallida*. Pale ashy white, hairs some white, others lead-coloured with grey tips. Brit. Mus.

Inhabits S. Africa. Brit. Mus.

11. SCOPOPHORUS, Gray; *Calotragus*, part Sundevall.

Muffle small, bald; tear-bag transverse; horns subulate, elongate, acute, slightly recurved at the tip; knees largely tufted; inguinal pores distinct and bearded; ears moderate, with a naked spot on the outside of their base; hoofs triangular, false hoof distinct.

1. SCOPOPHORUS OUREBI. The OUREBI.

Temple-spot small, indistinct; fur red-brown; cheeks paler; crown darker red brown; orbits, chest, belly, and middle of upper

part of inner side of legs white; end of tail, arched line before the eye and spot between the ears black.

Var. End of nose blackish.

Antelope Scoparius, Schreb. Licht. S. t. 13.—*A. Ourebi*, Shaw; Lesson.—*Ourebi*, Buffon, not F. Cuvier.—*A. melanura*, Bechst.

Inhabits S. Africa, Cape of Good Hope. Brit. Mus.

2. SCOPOPHORUS MONTANUS. The GIBARI.

Temple-spot large, deep (more than half an inch over), naked; fur greyish brown; cheeks paler; crown red brown; orbits, chest, belly, under side of tail and middle of the inner side of the upper parts of the legs white; end of tail and arched line before the eye black.

Antelope montanus, Rüppell, Zool. t. —*Scopophorus montanus*, Gray, Knowsley Menag. t. 5.

Inhabits W. and E. Africa; Abyssinia (*Rüppell*); Gambia. Called Gebari, or Mahomet's Antelope (*Earl of Derby*). Brit. Mus.

Very like the former, but grey brown, and the temporal spot much larger, deeper, more distinct and bald, both when alive and in the skin, so that it does not depend on the stuffing.

12. OREOTRAGUS, Gray, Sundevall; *Tragulus*, H. Smith, not Pallas.

Muffle large; tear-bag arched, transverse; horns subulate, elongate; hoofs squareish, high, compressed, much-contracted, concave beneath; false hoofs large, blunt; crown smooth; tail very short; hair thick, quill-like, spread out: female hornless; teats two.

1. OREOTRAGUS SALTATRIX. The KIANSI or KLIPPSPRINGER.

Dark brown, yellow grised; hair grey, brown at the end, with a short yellow tip; beneath whitish; edge of ears and feet above the hoofs black.

Antelope Oreotragus, Forster; H. Smith; Licht. Saugth. t. 15.—*A. saltatrix*, Bodd.; Harris, W. A. A. t. 24.—*Oreotragus saltatrix*, Sundev.; Gray, Knowsley Men. 8.

Inhabits S. Africa; Abyssinia (*Rüppell*). Brit. Mus.

Varies in brightness and depth of colour according to the season.

13. NESOTRAGUS, Von Duben, Sundev. MSS.

"Muffle large, bald; lachrymal sinus deep, large; face and forehead not crested; ears large; horns in males large; false hoofs none; tail very short.

Very like *Neotragus* in form and character.

1. NESOTRAGUS MOSCHATUS. The NESOTRAGUS.

Reddish grey; belly white; feet pale red; hair of back brown, with a pale subterminal band and black tip.

Nesotragus moschatus, Von Duben; Sundev. Vet. Ac. Oefversigt, 1846, 221; Pecora, 134; Gray, Knowsley Menag. 8.

Inhabits Zanzibar, east coast of Africa. Male and female in the Stockholm Museum."

14. NEOTRAGUS, H. Smith; *Madoqua*, Ogilby.

Muffle none; nose ovine; nostrils close together; false hoofs very small; tear-bag roundish; tail very short; crown crested.

1. NEOTRAGUS SALTIANA. The MADOQUA.

Antilope Saltiana, Blainv.—*A. Hemprichianus*, Ehrenb. S. P. t. 7; Licht. Saugth. t. 16.—*Neotragus madoka*, H. Smith.—*A. Grimmia*, Rüppell.—*A. Hemprichii*, Rüppell, Abyss. 25.—*N. Saltiana*, Gray, Knowsley Menag. 8.—*N. Hemprichianus*, Sundev.
Inhabits Abyssinia. Brit. Mus.

†† *A glandular line on the side of the face, in the place of the tear-bag; and the muffle large and bald.*

15. CEPHALOPHUS, H. Smith; *Sylvicapra*, Ogilby, Sundev.

Muffle large; tear-bag none, but a naked, glandular line, formed of two series of pores, on the side of the cheek; crown crested, ending in a tuft between the horns.

* *"Knees and hind legs tufted; ears and horns elongate; tear-bag small, under the eye, and a narrow naked streak on cheek."*

1. CEPHALOPHUS? QUADRISCOPE. The FOUR-TUFTED ANTELOPE.

"Buff, paler on the sides; tail, knee-tufts, front of nose, narrow inferior lateral and anal streak and streaks across legs blackish; lips, breast, belly, inside of limbs, vent and houghs white."

Antilope quadriscopa, H. Smith, G. A. K. iv. 261. t. 188.—*Cephalophus quadriscopa*, Gray, Knowsley Menag. 8.

"Inhabits Senegal."

This species is only known from Colonel H. Smith's description and figure.

** *Knees not tufted; ears elongate acute; horns slender, elongated.*

2. CEPHALOPHUS GRIMMIA. The IMPOON or DUYKER or DUYKER BOO.

Yellowish brown, greyish in winter; hair yellowish, with blackish tip; forehead yellowish bay; inside of ears, chin, throat, abdomen and under side of tail white; feet, streak on the nose, up the legs, and upper part of tail black; ears elongate, nearly as long as head, acute; horns black, elongate, slender, base rugose and subangular in front.

Capra Grimmia, Linn. S. N. (ed. 10) 70.—*Moschus Grimmia*, Linn. S. N. (ed. 12).—*Antilope mergens*, Blainv. Bull. Soc. Phil. 1817; H. Smith, G. A. K. v. 264; Licht. Saugth. t. 11; Harris, W. A. A. t. 15.—*A. nictitans*, Thunb. Mem. Petersb. 1811, iii. 312.—*A. Burckellii*, H. Smith, G. A. K. v. 262. adult in summer?—*A. Ptoox*, H. Smith, G. A. K. v. 265? jun.?—*A. Platous*, H. Smith, G. A. K. v. 266.—*Ceph. Grimmia*, Gray, Knowsley Menag. t. 1. f. 1, t. 2. f. 1, 2.

Inhabits S. Africa. Brit. Mus.

This species varies greatly in the intensity of the colours and in the extent of the black on the feet and nose. In one young specimen in the British Museum the black on the nose is quite deficient; though it has the bright colouring of the breeding-season, and is bright bay on the crown.

The specimen in the Museum of the London Missionary Society (No. 8 Blomfield Street, Moorfields, formerly in Austin Friars), Case 5, described by Colonel H. Smith under the name of *A. Platous*, is the size and has the horns and ears of an adult *C. Grimmia*, but differs in being paler, and having no dark colour on the nose or feet; but it is evidently much bleached. It has certainly no relation to the *C. sylvicultrix*, with which Colonel Smith was afterwards inclined to place it as a variety (Griff. A. K. Syn. v. 344).

There are three species which have been called *Antilope Grimmia*:—

1. The *Capra sylvestris africana* of N. Grimm, Misc. Cur. No-rimb. 1705, 131. t. 13, the authority for *Capra Grimmii*, Ray, Syn. 80, and Linn. S. N. (ed. 10) 70. *Moschus Grimmia*, Linn. S. N. ed. 12, from the Cape, of a dull grey colour. Probably the Duyker.

2. *Le Grimme* of Buffon, H. N. xii. 307. 329. t. 41. f. 2, 3, from a head sent from Senegal by Adanson; the *Antilope Grimmia* of Desmarest, F. Cuvier, and H. Smith, &c.; the *Cephalophus ruflatu*s.

3. The *A. Grimmia* of Pallas, with large ears and a black streak to the horns, like *C. Campbelliæ*, but is from Guinea. I know of no species common to the W. and S. coast of Africa, so that it is probably yet to be distinguished.

The "*Fitomba*" or "*Philantomba*" appears to be the generic name of all the W. African *Cephalophi* or Bush Antelopes.

3. CEPHALOPHUS CAMPBELLIÆ. THE BLACK-FACED PHILANTOMBA.

Grey and black grised, beneath white; cheeks, neck and chest yellowish; forehead yellow, with a black streak on the nose widening on the forehead and ending in a tuft behind the horns; feet and front of fore-legs reddish black; fur soft; hair grey, with black ring and tip; ears elongate acute.

Antilope Grimmia, Pallas, Spic. Zool. xii. 18. t. 1?—*C. Burchellii*, var. (*C. Campbelliæ*), Gray, Cat. B. M. 162.—*C. Campbelliæ*, Gray, Ann. and Mag. Nat. Hist. 1846, 164; Knowsley Menag. 9. t. 2. f. 3.

Inhabits S. Africa. Brit. Mus.

This species is at once known from the Duyker by being much darker and distinctly grised or dotted, and the under side being much whiter.

We have an adult female of this species sent us as *A. mergens*, var. *Burchellii*, by M. Sundevall (the other specimen of the same name being a true Duyker), and a young specimen which has been in the British Museum for several years, sent from Africa, under the generic name of *Philantomba*, by Mrs. Campbell.

The *A. Grimmia* of Pallas, Spic. Zool. i. 18. t. 3, which he describes as grey grised, becoming brownish ash on the buttocks; throat, chest and beneath the body white; head and neck yellowish

grey; a black streak between the horns, forming a fascia on the forehead and broader on the nose; fur softer than the Deer, but rough, of lower part of the neck rougher and more lax; feet and line on fore-legs blackish; tail black above; ears rather acute: inhabits Guinea; agrees in most respects with this species, but most probably is yet to be procured from W. Africa.

*** *Knees not tufted; ears moderate, acute; horns short, conical, thick.*

4. CEPHALOPHUS MADOQUA. The ABYSSINIAN BUSH BUCK.

Yellowish brown, slightly punctulated with black; neck yellowish; limbs blacker; face-streak and feet black; hair rather rigid, close-pressed, reddish grey at the base, end polished yellow brown, with dark tips; forehead reddish.

Antilope Madoqua, Rüpp. Abyss. t. 7. f. 2; Sundev.—*Madoqua*, Bruce's Travels, vii. 360. t. 56.—*C. Madoqua*, Gray, Knows. Men. 9. Inhabits Abyssinia. Mus. Frankfort.

This species is very distinct from *C. coronatus*, being darker, and the fur more rigid and close-pressed.

5. CEPHALOPHUS CORONATUS. The RED-CROWNED BUSH BUCK.

Pale yellowish brown; middle of back and front of fore-legs varied with a few scattered black hairs; crown bright bay; crest blackish brown, bay in front; feet and streak up the nose blackish; inside of ears, chin, throat, chest, belly and inner side of legs whitish; horns short, conical; ears about half as long as the head, acute.

Cephalophus coronatus, Gray, Ann. and Mag. Nat. Hist. x. 1842, 266. 1846, 164; Knowsley Menag. 9. t. 6. f. 1, 2.

Inhabits W. Africa; Gambia, Macarthy's Island. Mr. Whitfield called it *The Coquetoon*. Brit. Mus.

**** *Knees not tufted; ears moderate, rounded; horns conical, thick; without any streak over the eyes.*

6. CEPHALOPHUS SYLVICULTRIX. The WHITE-BACKED BUSH BUCK.

Blackish brown, minutely grised; hair brown, with whitish tips; back with a large yellowish white spot, narrow in front; throat, chest and belly redder; crown, nape and legs darker; horns —?

Antilope sylvicultrix, Afzelius, N. Act. Upsal. vii. 1238; H. Smith, G. A. K. t. 187.—*C. sylvicultrix*, Gray, Knowsley Menag. 10. t. 8. f. 1.

Inhabits Sierra Leone, in swampy places. Brit. Mus.

Varies in the size of the dorsal spot.

In the British Museum is a young male: length 29 inches; height 18; tarsus 6.9.

7. CEPHALOPHUS OGILBII. The BLACK-STRIPED BUSH BUCK.

Pale bay brown, with a deep black dorsal streak; beneath pale; crown and haunches brighter bay; neck and withers, and sides of the

dorsal line varied with deep brown hairs; streak up the fore-leg, upper part of hock, feet (above the hoof) and end of tail blackish; horns short, thick, conical, very rugose on the inner front edges of the base.

Cephalophus Ogilbii, Gray, Ann. and Mag. Nat. Hist. 1842; Knowsley Menag. 10. t. 8. f. 2; Frazer, Zool. Typ. t. — *Antilope Ogilbii*, Waterh. P. Z. S. 1838, 60. 1842, 129.

Inhabits Fernando Po (*J. Thompson, Esq.*). Brit. Mus. Not half the size of the preceding.

8. CEPHALOPHUS DORSALIS. The BAY BUSH GOAT.

Dark bay; shoulders and legs darker; hair brown, a few on the haunches white-tipped; crown and nape, broad streak along the back to end of tail black; spot over each eye; lips, sides of chin, front of chest, under side of tail and inside of thighs pale brown.

Cephalophus dorsalis, Gray, Ann. and Mag. Nat. Hist. 1846, 165; Knowsley Menag. 10. t. 7. f. 1.

Inhabits Sierra Leone: called *Bush Goat*. Brit. Mus. The head is very large, the skull short, broad, forehead rounded.

9. CEPHALOPHUS NIGER. The BLACK BUSH BUCK.

Sooty black, greyer in the front half of the body; chin, throat, abdomen and inside of thighs grey; forehead and crown dark bay and black mixed: cheeks pale brown and black varied; tail, end whitish.

Antilope niger, Mus. Leyden.—*Cephalophus niger*, Gray, Ann. and Mag. Nat. Hist. 1846, 165; Knowsley Menag. 10. t. 7. f. 2.

Inhabits Guinea. British Museum. Sierra Leone (*Mr. Whitfield*). Knowsley Museum.

In the British Museum there is a male from the Leyden Museum, nearly as large as the former.

10. CEPHALOPHUS NATALENSIS. The NATAL BUSH BUCK.

Bright red bay; nape, withers and feet varied with dark grey hairs; nose-streak short, blackish; lips, chin, upper part of throat and end of tail white; lower part of cheeks, throat and abdomen pale yellowish; crown and tuft bright red; horns short, conical.

Antilope natalensis, A. Smith, S. Afr. Quart. Journ. 217; Illust. Z. S. A. t. 32.—*Cephalophus natalensis*, Gray, Knowsley Menag. 10.

Inhabits S. Africa. Port Natal. Brit. Mus. Five specimens of different ages. Resembles *C. Ogilbii* in size and colouring, but wants the dorsal streak. The females are horned.

11. CEPHALOPHUS RUFILATUS. The COQUETOON.

Deep reddish bay; legs, nape, streak on the nose to the crown and broad streak on the back blackish grey; ears blackish; crest and upper part of tail black; cheeks rather paler; chin and abdomen pale yellowish; inside of ears whitish, with a brown spot on the outer side; horns conical, rather elongate, obscurely annulated, slightly recurved.

Cephalophus rufilatus, Gray, Ann. and Mag. Nat. Hist. 1846, 166; Knowsley Menag. 10. t. 9.—*Antelope Grimmia*, H. Smith, G. A. K. v. 266.—*Le Grimme*, Buffon, H. N. xii. t. 41. f. 2, 3?

Var. 1. Sides paler, greyish red; forehead rough.

Le Grimme, F. Cuv. Mamm. Lithog. t. . not good.

Inhabits Sierra Leone, called *Coquetoan*. Brit. Mus.

The hair is rather paler at the base, of the dorsal streak grey, with a blackish tip.

M. F. Cuvier's (Mamm. Lithog. t. .) figure is the pale variety, which Mr. Whitfield regards as distinct; he says it is called *Grimme* by the natives: the separate head of Cuvier's plate appears to have been taken from the *Guevei*.

*** *Knees not tufted; ears moderate, rounded; horns short, thick, conical; head with a pale streak on each side over the eyes to the base of the horns.*

12. CEPHALOPHUS MAXWELLII. The GUEVEI.

Grey brown or sooty brown; sides of head and body greyer; chin, throat, chest and belly whitish grey; abdomen and front of thigh white; broad streak over each eye to the base of the horns yellowish white; feet and end of nose rather darker; fur rather rigid; hair uniform.

Antelope Maxwellii, H. Smith, G. A. K. iv. 267.—*A. pygmea*, Pallas, Spic. xii. 18?—*The Guevei*, Buffon, H. N.—*A. pygmea* (*Guevei*), F. Cuv. Mamm. Lithog. t. . good.—*A. Frederici*, Laur.; Sundev.—*A. Philantomba*, Ogilby, P. Z. S. 1836, 121; 1839, 27.—*Cephalophus Maxwellii*, Gray, Knowsley Menag. 11. t. 12.

Inhabits W. Africa. Brit. Mus.

The adult male in the British Museum is bright sooty brown, darker near the rump; the female is nearly uniform pale grey brown. It is well figured by M. F. Cuvier. It is known from *C. monticola* by being larger, by the whiteness of the eye-streak, and of the front of the thigh and chest.

13. CEPHALOPHUS MONTICOLA. The NOUMETGE or CAPE GUEVEI.

Grey brown; streak over the eyes, legs and outer part of thighs rufous; feet grey brown; chin, chest, abdomen, and under side of tail and inside of ears white; fur soft, grey, with intermixed rather rigid black hairs.

Antelope monticola, Thunb. Stockh. N. H. xxxii. t. 5.—*A. cærulea*, H. Smith, G. A. K. v. 855; Daniell's Afr. Scen. t. .; Harris, W. A. A. t. 26.—*A. perpusilla*, H. Smith, G. A. K. v. 854.—*A. pygmea*, Licht. Saugth. t. 16; Sundevall.—*Cephalophus monticola*, Gray, Knowsley Menag. 11.

Inhabits S. Africa. Brit. Mus.

The colours vary in intensity; in a female in the British Museum, the rufous colour of the thighs and the white of the chest are more distinct than in the male, but this may depend on the season when

they were killed. A very young fawn (perhaps hardly born), which was brought home from the Cape by M. Verreaux, is darker, and the reddish tint extends over nearly the whole body.

Thunberg described the South African species, but says that there is a specimen in the Stockholm Museum, brought by Äfzelius from Sierra Leone, which agrees with his animal; so he evidently did not observe the difference between the two species.

14. CEPHALOPHUS MELANORHEUS. The BLACK-RUMPED GUEVEI.

Grey brown; throat and sides paler; rump and upper part of tail black; chin, chest, abdomen, back and front edge of thighs and under part of tail white; narrow streak over the eyes whitish; feet like the back; fur soft, pale grey, with intermixed rather rigid black hairs.

Cephalophus melanorheus, Gray, Ann. and Mag. Nat. Hist. 1846; Knowsley Menag. 11. t. 10.—*C. Philantomba*, Gray, Cat. Mamm. B. M. 163 (not H. Smith).

Inhabits Fernando Po (*J. Thompson, Esq.*). Brit. Mus.

This species is coloured like the *Guevei* from W. Africa, but smaller, and have the soft fur and interspersed black hair of the *Cape Guevei*, *C. monticola*, but they are easily known by the black mark on the rump.

15. CEPHALOPHUS PUNCTULATUS. The GRISLED GUEVEI.

Dark fulvous brown; sides and legs rather paler; narrow streak over the eyes and inside of ears pale brown; chin, throat, chest, belly and front of thighs and under part of tail white; hair grey at the base, with brown ends and yellow subterminal rings; crown and upper part of tail darker; feet pale, varied.

Cephalophus punctulatus, Gray, Ann. and Mag. Nat. Hist. 1846; Knowsley Menag. 11. t. 11. f. 1.

Inhabits Sierra Leone. Brit. Mus. A young specimen presented by Colonel Sabine, R.E.

It is at once known from the other *Gueveis* by the fulvous colour which is produced by the yellow subterminal rings of the hairs.

Colonel H. Smith indicates a species under the name of *C. Philantomba*, but so indistinctly, that it is impossible to know for what it is intended.

16. CEPHALOPHUS WHITFIELDII. The WHITE-FOOTED GUEVEI.

Yellowish ash; shoulders, outside of limbs and hinder parts of back rather darker; ears and crown pale yellowish brown; streak over the eyes, cheeks, throat, belly, inside of the limbs and ring round the feet above the hoof ashy white; hair ashy grey; of the back brown at the end, with a yellow tip.

Cephalophus Whitfieldii, Gray, Knowsley Menag. 12. t. 11. f. 2.

Inhabits Gambia (*Mr. Whitfield*). Mus. Brit. Young.

Smaller than the *Grisled Guevei*, and much paler and yellower.

***** *No tear-bag nor glandular streak on the face, and the muffle large and moist; crown smooth.*

16. NANOTRAGUS, Sundev.; *Neotragus*, part H. Smith.

Horns very short, conical; legs slender; tail subpectinate; hoofs small, triangular, false hoofs none; crown not crested; ears small, rounded.

1. NANOTRAGUS PERPUSILLUS. The ROYAL ANTELOPE.

Fulvous; throat, belly and edge of thighs and tip of tail white.

Capra perpusilla, Linn. Mus. Ad. Fred. i. 12.—*Moschus pygmeus*, Linn. S. N. (ed. 12) 92.—*Antelope pygmea*, Pallas, Spic. Zool. xii. 18; Cuv. D. S. N. ii. 241; H. Smith.—*A. regia*, Erxleben, 278.—*A. spiniger*, Temm. Monog.—*Nanotragus regius*, Gray, Knowsley Menag. 12.—*Royal Antelope*, Penn.

Inhabits W. Africa; Guinea. Brit. Mus.

The smallest-hoofed animal. The feet were formerly often used as tobacco-stoppers, and are figured mounted by Seba, t. 43. f. a, b; Buffon, H. N. xii. t. 42, 43.

17. ELEOTRAGUS, Gray; *Redunca*, H. Smith; *Cervicapra*, Blainv., Sundev.; *Nagor*, Laur.; *Sylricapra*, Ogilby.

Horns conical, bent back and then forward at the top; hoofs and false hoofs rather large; tear-bag none; teats four; inguinal pores distinct.

† *Horns erect, slender, and face narrow; nose swollen; muffle large, extended far behind the nostrils; fur woolly hair.* PELEA. S. Africa.

1. ELEOTRAGUS CAPREOLUS. The REHBOCK or PEELE.

Temple-spot none; head slender, compressed; horns erect, scarcely diverging, very slender; fur short, woolly, grey brown; back redder; throat and beneath white; end of nose and chin blackish; feet darker.

Antelope Capreolus, Thunb.; Afzelius, N. Act. Upsal. vii. 251. 1818; Licht. Saugth. t. 8; Harris, W. A. A. t. 25. f. 1.—*A. villosa*, Burchell, 1822; H. Smith.—*A. lanata*, Desmoul.—*Eleotragus Capreolus*, Gray, Knowsley Menag. t. 12. from life.

Inhabits S. Africa. Brit. Mus. Knowsley, living.

†† *Horns diverging, thick, conical; head broad; nose not swollen.*

* *Muffle large, extended far behind nostrils; fur grised, harsh, straight, with a subterminal pale band, and often whorled; a naked spot on the temple.* South Africa.

2. ELEOTRAGUS ARUNDINACEUS. The INGHALLA or REIT BOCK.

Head broad; temple-spot naked; horns diverging, conical, tapering. Brown, yellow grised; hair pale brown, with a subterminal yellow band; cheeks and neck yellower; base of ears, chest, belly and insides of the legs and under side of bushy tail white; front of legs black.

Antelope arundinacea, Shaw, Zool.—*A. Eleotragus*, Schreb. Licht. t. 9; H. Smith; Harris, W. A. A. t. 26.—*A. redunda*, H. Smith; Gray, Cat. B. M.—*A. cinerea*, Afzelius, 1815.—*A. Lalandii*, Desm.; Fischer.—*A. Lalandiana*, Desm.—*Eleotragus arundinaceus*, Gray, Knowsley Menag. 12.

Var. Larger.

A. Isabellina, Afzelius, N. Act. Upsal. 1815, vii. 244; Licht. t. 10; H. Smith; Sundev.

Var. With a large black rhombic spot on the back of the head behind the ears. Female in Brit. Mus.

Inhabits S. Africa, in marshy places. Brit. Mus.

Afzelius, Lichtenstein, H. Smith and Sundevall have described two species of this genus as coming from South Africa; the smaller they call *A. Eleotragus*, and the larger *A. Isabellina*. The latter author has given a comparative character between the two kinds, but he has only seen two specimens of the former (a male at Berlin and a female at Stockholm), and several specimens of the larger kind. I have examined with care a series consisting of four males and five females from different parts of South Africa, and can find no distinction between them, except a slight difference in the length of the fur and in its colour. Two specimens in the British Museum are larger than the rest, and have the tarsus one-fourth longer than the others; they have a shorter fur and are of a rather brighter colour, and the front of the leg is blacker; but the fur and colour probably depend on the season when they were killed. In these respects they agree with Sundevall's description of *A. Isabellina*, but they both have the temporal spot large and quite naked, while Prof. Sundevall described the spot on this species as pubescent. The female of the larger specimen that has the black spot on the back of the head; some of the smaller ones have the temple-spot much smaller and less naked than the others. The two larger specimens have a single whorl of hair in the middle of the back; the others, with longer hair, show the whorls more distinctly, and have the hair from the central whorls to the shoulders forming a more or less diverging line. After examining these specimens and those in other collections, I conclude that they form only a single species. M. Sundevall, in a note just received, observes, "Mr. Wahlberg considers *A. Isabellina* and *A. Eleotragus* as very distinct, and our specimens seem to show a difference, though not very well expressed. Also I have committed a mistake, for the young female described in my Synopsis as γ . under *A. Isabellina*, is really *A. Eleotragus*."

** *The muffle smaller, scarcely extending beyond the nostrils; fur fulvous, not grised; hair grey, with yellow tips; tail less bushy.*
W. and E. Africa.

3. ELEOTRAGUS REDUNCUS. The WONTO or NAGOR, or RED ANTELOPE.

Head broad; horns conical, thick at the base, diverging; fulvous brown, rather pale on the sides; hair soft, yellow tipped, all in regu-

lar order; chin, throat, spot under ears and over eyes, inside of limbs, under side of tail and lower side of body white; front of leg sometimes blackish.

Antelope redunca, Pallas?; Rüppell, Abyss. t. 7, good.—*A. rufa*, Afzelius, 250, from Buffon.—*A. reversa*, Pallas?—*Nagor*, Buffon, xii. t. 46?—*Oureby*, F. Cuv. Mamm. Lithog. t. ♀.—*A. Isabellina*, Gray, Cat. Mamm. Brit. Mus.—*Eleotragus reduncus*, Gray, Knowsley Menag. 13. t. 13.

Inhabits "Senegal." Mus. Frankfort and Mus. Leyden. Gambia (*Whitfield*), where it is called *Wonto*. Male and fawn, British Museum, and a young male living at Knowsley, from the Gambia.

Var. Larger, colour brighter.

A. Bohor, Rüppell, Abyss. t. 7; Sundev.

Inhabits Abyssinia. Mus. Frankfort.

Pallas and Afzelius's account of this species is derived from Buffon's description; both he and Adanson (Hist. Nat. xii. 326) say that it is "all pale red," and Buffon further observes that it has not the white on the belly of the Gazelles. This does not agree with our animal, which is white in several parts, but certainly not so white as the Gazelle, and has black on the legs; but as yet no other animal has been brought from West Africa, which better agrees with their account or figure.

M. Sundevall considers specimens of the *Nagor* of Senegal and the *Bohor* of Abyssinia, in the Frankfort Museum, as distinct, the former having the hair of the back whorled, the fore-leg with a dark stripe, and the latter having the hair not whorled and the legs pale. Our specimens, from Gambia, have the hair not whorled, and more or less distinct streaks on the fore-legs; hence I am inclined to believe the *Nagor* and the *Bohor* to be alike. Sundevall's animal may be the *Kob*, but that has only one whorl on each end of the back, a nearly cervine muffle, and the end of the tail black.

When in Frankfort, I observed that the male *Antelope Bohor*, from Abyssinia, was rather larger than the male of "*A. redunca*," from Senegal, in the same collection, and much brighter, and the horns more slender; the female was darker and browner than the male; both sexes have more black on the carpus and tarsus than in the specimen of *A. redunca* in the same museum.

Colonel Hamilton Smith formed a genus for two pairs of horns on part of the frontal bones in the College of Surgeons belonging to this group of Antelopes, which he called *Raphicercus acuticornis* and *R. subulata* (Griffith, A. K. t. 181. f. 2, 1). The figures are not sufficient to identify the species, and we now know that the horns of the same species differ greatly in individuals of the same species, and during the growth of the same specimen. *R. acuticornis* may be the horns of the *Duyker Boc*, *Ceph. Grimmia*?

2. The CERVINE ANTELOPES have an elongated tail, cylindrical at the base, and with long hair at the end, often forming a compressed ridge; the body heavy and the limbs strong. They are of a large size.

A. Neck not maned.

18. ADENOTA.

Muffle cordate, moderate, cervine; nose hairy between the back of the nostrils; horns sublyrate, ringed, when young rather recurved; place of tear-bag covered with a tuft of hair; hair of the back whorled, of dorsal line and back of head reversed; tail elongate, hairy.

This genus is very like *Eleotragus*, but has a smaller, more cervine muzzle and lyrate horns; it differs from *Cobus* in the form of the tail, and wanting the mane, and from both in having a tuft of hair in the front of the orbit.

* Horns sublyrate; tail hairy.

1. ADENOTA KOB. The ÆQUITOON.

Pale brown; end of nose, inside of ears, chest, belly, inside of legs and thighs, tip of tail, and band above hoofs white; front of fore and hind legs, and end of ears and tail black; hair of the dorsal line reversed, with a whorl on the shoulders and loins.

Antelope Kob, Erxl. from *Kob*, Buffon, H. N. xii. t. 32. f. 1? —*Kobus Adansonii*, A. Smith, from Buffon. —*Gambian Antelope*, Penn. Syn. 39, from Buffon. —*A. adenota*, H. Smith, G. A. K. iv. 224. t. 184. and t. 183. f. 3, 4. horns?

A. Kob, Ogilby, P. Z. S. 1836. —*A. annulipes*, Gray, Ann. and Mag. Nat. Hist. 1843. —*Adenota Kob*, Gray, Knows. Menag. 14. t. 14, 15.

Var. Female, hair longer, sides of face whitish.

A. sing-sing, Gray, Cat. Mamm. Brit. Mus. 159, not Bennett.

Inhabits W. Africa; Gambia. Called *Æquitoon* by the Joliffs, and *Kob* by the Mandingoes.

A fine pair has been at Knowsley some years. Thinking them new, I described them as *A. annulipes*. Mr. Ogilby has called it the *Nagor*, but it is scarcely the *Nagor* of Buffon. An adult male noticed by Mr. Ogilby as the *Kob* is now in the Museum of the Zoological Society; its horns, like the male at Knowsley, are much worn down. They whistle like a stag.

Buffon (H. N. xii. 219. 267. t. 32. f. 1) figures a skull with horns, brought from Senegal by Adanson, under the name of *Kob*, which is also called the *Petit vache brune*. Erxleben gave this figure the name of *A. kob*, and Pennant called it the *Gambian Antelope*, Syn. i. 39. The figures somewhat resemble the head of a half-grown male of this species, but the horns are longer, and have more rings than the specimen in the British Museum; but I am inclined to agree with Mr. Ogilby in believing that it was intended for this species. In the Jardin des Plantes they called the Sing-Sing the *Kob* of Senegal; this may be a mistake for the *Koba*. I may remark that the horns of the *Koba* in the same plate of Buffon are represented with more rings than are mentioned in the description.

Colonel Hamilton Smith describes and figures a male and female specimen which were alive in Exeter Change, and figures the male and its skull and horns under the name of *A. adenota*, which well

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agrees with this species, and has the peculiar distribution of its hair ; hence its name : but he says, it has "a long open suborbital slit, and small black brushes on the knees ;" but this I suspect must be a mistake, as he himself observes no lachrymal cavity was found in the skull. He might have mistaken the tuft of hair for the gland at the distance at which he saw the specimens. He also (G. A. K. iv. 221) described a specimen which was in Exeter Change, which he regarded as the *Gambian Antelope* of Pennant, and calls *A. forfex*. His characters agree in most particulars with this species, but he says it had "a long lachrymal sinus, and had small brushes on the knees." If there was not some mistake in transcribing these descriptions, both these animals should be *Gazellas*, but I have never seen any which agreed with them.

The young male in the British Museum shows the development of the horns of these animals. The upper rings of the growing horn fall off in large thick flakes as the horn increases in size beneath : this explains how the extent of the smooth tapering part of the horns increases in length as the horn grows, and how the number of rings are found to be nearly the same in the various ages, and different individuals of the various species. Mr. Whitfield informs me that the scrotum is rarely developed or dependent externally in different kinds of Antelopes before they have completed their first year.

**** Horns elongate, recurved at the tip ; tail slender, end tufted.**

2. ADENOTA LECHÈ. The LECHÈ. (Mammalia, Pl. XX.)

Pale brown ; orbits, chest and beneath white ; front of legs dark brown ; fur short, adpressed, upper part of nape and withers with a small whorl of hair ; tail slender at the base.

Léchée, Oswell, Journ. Roy. Geog. Soc. xx. 150, 1850.—*Kobus Lechè*, Gray, Knowsley Menag. 23.

Inhabits S. Africa ; bank of river Zouga, lat. 22° S. (*Capt. Frank Vardon*). *Oswell*, l. c. 150, Brit. Mus.

This animal is nearly as large as the *Water Buck*. The horns are very like those of that animal ; the neck is covered with short adpressed hair, and has no appearance of a mane.

b. Neck maned on the sides.

19. KOBUS, H. Smith ; *Cervicapra*, § Sundev. ; *Ægocerus*, Harris ; *Kolus*, Gesner, Gray.

Horns elongate, sublyrate, bent back and then forward at the top ; muzzle cervine ; tear-bag none ; inguinal pores none ; hair rough, elongate ; neck covered with longer, diverging and drooping hair ; tail rather elongated, depressed, hairy on the sides and below : females hornless ; teats four ; animal very large.

1. KOBUS ELLIPSIPRYMNUS. The PHOTOMOK or WATERBUCK.

Rump with a whitish elliptical ring near the base of the tail, brownish ; horns converging at the tip.



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W. P. LECHE, Gray

Vol. 3, p. 40, fig. 10

Antelope Ellipsiprymna, Ogilby, P. Z. S. 1833, 47; Harris, W. A. Africa, t. 14.—*Kobus Ellipsiprymnus*, A. Smith, Illus. Z. S. A. t. 28, 29.—Gray, Knows. Menag. 15.

Inhabits S. Africa. Brit. Mus.

The horns figured as *A. Kemas*? (H. Smith, G. A. K. t. 181. f. 6) appear to belong to this species.

2. KOBUS SING-SING. The SING-SING.

Anal ring none. Reddish or yellowish grey brown, rather greyer on the shoulders; nose, lips and hinder part of the thighs, under the neck, from the ears to the gullet, a streak over each eye, and ring above the hoofs and false hoofs white; belly and legs blacker; end of tail, and legs from shoulder to hough black. Female greyer; belly and upper part of legs paler.

Antelope Sing-Sing, Bennett, Waterhouse, Cat. Zool. Soc. Mus. 41. n. 378.—*A. defassa*, Rüppell, Abyss. t. 3.—*A. unctiosa*, Laur., D'Orbig. Diet. Univ. H. N. i. t. 622. ♂. good.—*A. Koba*, Ogilby, Penny Cyclop. ii. 79. fig. ♀; P. Z. S. 1836, not Erxleben.—*Koba*, Buffon, H. N. xii. 210, 267. t. 32. f. 2, horns?—*Senegal Antelope*, Pennant, Syn. 38 (part from Buffon only).—*Kobus Sing-Sing*, Gray, Knows. Menag. 15.

Inhabits N. and W. Africa; Senegal; Gambia, where it is called *Kassimause* and *Kob* (*Whitfield*). Brit. Mus. Abyssinia (*Rüppell*). Mus. Frankfort.

This species varies much in the tint of the colouring, and in the length of the hair in the different seasons. In summer they are covered with very short, closely pressed fur, letting the skin be seen between the hairs. In the cold weather, and in England, the fur is longer and more abundant. The hair of the chin and neck is long and rigid in all seasons, and even in the young animals. The tail of the adult specimen is cylindrical and nearly bald, ending in a tuft of black hair; in the young specimens, especially in the winter fur, the base of the tail is fringed with hair on each side. The male is much brighter coloured, and the chest and belly are nearly black like the legs. The hinder parts of the rump of the young animals are greyish white; in the older specimens it becomes pure white and broader in extent.

This animal is called *Sing-Sing* by all the negroes. They do not think their flocks of cattle will be healthy or fruitful unless they have one of the Sing-Sings accompanying them, as some persons think a Goat necessary to be in a stable in England. The English on the Gambia call it the *Jackass Deer* from its appearance, and it is called *Koba* and *Kassimause* by the negroes at Macarthy's Island. Its flesh is very strong, unpleasant, and scarcely palatable.

As far as I could judge by my recollection and description, the adult specimen at Knowsley, the young male and adult female in the British Museum, the male and female at Frankfort, and the adult male in the Paris menageries, are the same species.

Buffon figured (Hist. Nat. 210, 267. xii. t. 32. f. 2) under the name of *Koba* a pair of horns which were in the library of St. Victor

at Paris. He described them as larger and more curved above than those of the *Kob*, eighteen inches long and five inches in circumference at the base, and he refers them to an animal which Adanson says is called *Koba* in Senegal, and the *Great Brown Cow* by the French colonists. Pallas refers these horns to *A. Pygargus*, and the figures and description agree in many particulars with the horns of that species; but they are rather longer, and have more rings. Pennant (Syn. Mam. 38) has given the name of *Senegal Antelope* to Buffon's short account and figure, but has added to it the description and the figure of the head of a skin which came from Amsterdam, and appears to be *A. Caama* of South Africa. Cuvier (Dict. Sci. Nat. ii. 235) has translated Pennant's name to *A. Senegalensis*. Erxleben (Syn. 293) and Zimmerman (Zool. 345) have translated Pennant's description of his skin of *A. Caama*, and called it *A. Koba*, referring to Buffon's description and Daubenton's figure. Fischer, Hamilton Smith and M. Sundevall regard the *Koba* of Buffon the same as the *Korrigum* of Denham and Clapperton, but the horns of that species are considerably longer and much thicker at the base than those described by Daubenton, and the annulations of the horns are higher and more regular: but it may be remarked that Buffon describes his horns as having eleven or twelve rings, but figures them as having seventeen or eighteen. Mr. Ogilby (Penny Cyclopædia and the Proceedings of the Zoological Society) considers Buffon's *Koba* to be the *Sing-Sing*; and in the length of the horns, and in the number, disposition and form of the rings, his figure more nearly agrees with the horns of that species than of that of the *A. Pygarga*, to which Pallas first referred it; but the horns are represented much more lyrate than any horns of the *Sing-Sing* I have seen; indeed, not one of the specimens which have come under my observation have had any inclination to assume that form: but as this is the only Western-African species which in any way agrees with Buffon's figure, perhaps it is best to adopt Mr. Ogilby's suggestion. The name of *Koba* or *Kob* appears to be common to many species. Schinz erroneously considers *Damalis Senegalensis*, *Antilope adenota* and *A. forifer* (H. Smith) as synonyms of this species.

c. *Nape with a linear, central, compressed, recurved mane.*

20. AIGOCERUS, H. Smith; *Egocerus*, Desm.;
Hippotragus, Sundev.

Horns conical, elongate, rather compressed, ringed, recurved; back of the neck with a linear reversed mane; tear-gland covered with a tuft of hair; teats two.

1. AIGOCERUS EQUINUS. The ETAAK or EQUINE ANTELOPE.

Spot above the eyes and pencil before the eyes fulvous grey; nose whitish; face black; nuchal mane distinct.

Aigoceros Equina, H. Smith; Harris, W. A. A. t. 21.—*A. glauca*, Forster.—*A. Osanne*, Geoff.—*A. barbata*, H. Smith.—*A. Truteri*, Fischer.—*A. aurita*, Burch. MSS.—*Capra Æthiopica*, Schinz.—

Tzeiran, Buffon, H. N. xii. t. 31. f. 6, horn.—*Aigocerus Equinus* and *A. leucophæus*, Gray, Knows. Men. 16.

Inhabits S. Africa. Brit. Mus. W. Africa; Gambia (*Whitfield*).
Horns. Brit. Mus.

Var.? Smaller. "Fur glaucous grey; tuft before the eye short, brown; nuchal crest none; hoofs small."—*Sundevall*.

Antelope leucophæus, Pallas; H. Smith, G. A. K. v. t. 179.—*Aigocerus leucophæus*, Gray, Knows. Menag. 16.

Inhabits the Cape of Good Hope; now extinct. Mus. Stockholm, Mus. Upsal and Mus. Paris.

The head of the female covered with the skin from Macarthy's Island, on the coast of Gambia, which Mr. Whitfield brought home, did not appear to differ from the specimen from the Cape in the British Museum. The species does not appear to be uncommon in the locality, for Mr. Whitfield brought over several pairs of horns. He states the flesh is very good venison. "It is called *Dacoi* or *White Mouth* by the Mandingoes, *Kob* and *Koba* by the Joliffs, and *Vache brune* by the French at Senegal." This is certainly not the *Kob* of Buffon (xii. t. 32. f. 1, 2). The negroes at the Gambia declare that this animal never bears more than one fawn; for after that period, the horns increase in length, and enter the loins and destroy the animals!

Buffon (xii. 271. t. 31. f. 6) figures the horn of this species, which had been made into a powder-flask, under the name of *Tzeiran*.

A. barbata of Daniels appears to be only a bad drawing of this species.

The variety is the size of the Common Stag, *Cervus Elaphus*. M. Sundevall observes that it is as different from *A. Equina*, as the species of *Eleotragi* and *Tragelaphi* are from one another; and he observes, in a letter I have just received, "I must tell you, that after the inspection of a whole series of *A. Equina*, which Wahlberg brought home, I am convinced that the *A. leucophæa* of Pallas is a very distinct race. Our stuffed specimen, that must have been adult, has much smaller hoofs than the very young *A. Equina*, male as well as female, amongst Wahlberg's, and in the tuft over the lachrymal sinus, as I have shortly expressed in the printed survey."

When I examined the specimen at Paris I regarded it as a young or rather dwarf specimen of *A. Equina*, and the absence of the nuchal crest led to this belief; and I am not satisfied that the number of rings on the horns are a sufficient proof of its being adult.

2. AIGOCERUS NIGER. The BLACK BOK.

Black; female and young brown; face white, with a dark streak.

Antelope niger and *A. Harrisii*, Harris, Wild African Anim. t. 23.—*Aigocerus niger*, Gray, Knows. Menag. 17.

Inhabits S. Africa. Brit. Mus. Males and female and young.

21. ORYX, Blainv., H. Smith.

Horns elongate, subulate, ringed at the base, straight, or slightly arched, placed in a line with the face; neck maned above and below;

tear-bag none; nose subcervine, with a marginal muffle; hoofs narrowed in front, false hoofs large; teats four (two, *Harris*). In the skull there is a slight suborbital fissure, but no pit, and the grinders have supplementary lobes.

* *Horns straight.*

1. ORYX GAZELLA. The KOOKAAM or GEMSBOK.

Horns straight, shelving backwards; throat with a bunch of black hairs; black streak on the face, conjoined under the chin; rump, face, spinal line, lateral streak, and very broad band on the thigh and cubitus black in summer. Young pale brown; hairs blackish at the base.

Capra Gazella, Linn.—*Antilope Oryx*, Pallas; H. Smith.—*A. bezoartica*, Pallas.—*A. recticornis*, Erxl.; Pallas, Nov. Comm. Petrop. xiii. t. 10. f. 6.—*Oryx Capensis*, Ogilby; Harris, W. A. A. t. 9.—*O. Gazella*, Gray, Knows. Menag. 17. t. 16. f. 2, young.

Inhabits S. Africa; Cape of Good Hope. Brit. Mus. Adult and young.

2. ORYX BEISA. The BĒISA.

Horns straight; throat without any bunch of hairs; black face-streaks separate. "Pale; face, belly and limbs white; front of face, two streaks on cheek, narrow line along throat, dorsal streak, streak on each side of abdomen, band round upper part, and streak in front of lower part of fore-leg and end of tail black."

Antilope Beisa, Rüppell, Atlas, t. 5.—*Oryx Beisa*, Sundevall.—*A. Dammah*, Rüppell.

Inhabits Abyssinia. Mus. Frankfort.

There is a male and female in the Frankfort Museum; they are smaller than *A. Gazella* of the Cape, and both have the face-streaks separate: there is a black streak on the throat, as in *A. Gazella*, but no bunch, nor is there any in the Frankfort specimen of *A. Gazella*: the mane of the nape of the male is small, indistinct, continued behind in a broader dark streak to the middle of the loins. In the male the mane is blackish, in the female like the back. They have no dark mark on the rump, found in *A. Gazella*.

** *Horns arched, recurved.*

3. ORYX LEUCORYX. The ORYX.

Horns slender, slightly arched: white, reddish varied; in winter greyish.

Antilope leucoryx, Pallas; Ehrenb. S. P. t. 3; Licht. Saugth. t. 1.—*A. ensicornis*, Ehrenb.—*A. Algazella*, Rüpp. t. —*A. Gazella*, Pallas.—*A. bezoartica*, Erxl.; H. Smith.—*Algazelle*, F. Cuv. Mam. Lith. t. —*A. Eleotragus*, Schreb. t. . (not descrip.)—*Oryx leucoryx*, Gray, Knows. Menag. 17. t. 16. f. 1, young; t. 17, adult.

Inhabits N. and W. Africa; Nubia; Sennaar; Senegal. Brit. Mus.

I have compared the Nubian and Senegal specimens, and cannot discover any difference between them.

D. *Throat slightly maned, neck simple.*

22. ADDAX ; *Oryx*, part Blainv. and others ; *Gazella*, part H. Smith.

Horns slender, elongate, ringed, slightly spirally twisted, nearly on a line with the face ; neck with a slight gular, but no nuchal mane ; nose ovine, hairy ; hoofs semicircular, edged ; tear-bag marked by a tuft of hair ; forehead longly hairy.

1. ADDAX NASOMACULATUS. The ADDAX.

White ; forehead and front of face darker ; grey in winter.

Antelope nasomaculatus, Blainv. Bull. Soc. Phil. 1816, 78 ; H. Smith.—*A. Addax*, Licht. Saugth. t. 2 ; Rüpp. Atlas, t. 7 ; Mam. Lith. t. . —*A. suturosa*, Otto, N. A. Nat. Cur. xii. t. 48 ; Griffith, A. K. t. 180.—*A. gibbosa*, Savi.—*A. Tao*, H. Smith.—*A. Mytilopes*, H. Smith, G. A. K. t. 182, 183. f. 6.—*Strepsiceros*, Cajas.—*Addax*, F. Cuvier, Mam. Lith. t. . (winter and summer) ; Ehrenberg, S. Phys. t. 4, male and female.—*Capra Cervicapra*, Linn. S. N. ed. 10.—*Ant. Cervicapra*, Children, Denham Trav.—*Addax nasomaculatus*, Gray, Knows. Men. 17. t. 18.

☿ Inhabits N. Africa. Brit. Mus.

3. The GOAT-LIKE ANTELOPES have a very short flat tail, hairy above. They have heavy bodies, covered with rough, rigid or woolly fur, strong legs, large hoofs and false hoofs. The horns are conical and recurved.

A. *Nose cervine, muffle moderate ; horns short, inclined, recurved.*23. CAPRICORNIS, Ogilby ; *Nemorhedus*, part H. Smith.

Horns short, strong, conical, ringed, inclined and recurved, arising behind the orbits ; nose cervine, muffle moderate, bald ; tear-bag and interdigital pores large ; skull with a more or less deep rounded pit, and no suborbital fissure ; grinders without supplemental lobes. Asia.

1. CAPRICORNIS SUMATRENSIS. The CAMBING OUTAN.

Black ; chin and linear nuchal mane yellowish, especially near the withers ; inside of the ears white. Young like the adult.

Antelope Sumatrensis, Shaw ; H. Smith, G. A. K. t. 189 (cop. from) ; F. Cuv. Mam. Lith. t. . —*A. interscapularis*, Licht.—*Capricornis Sumatrensis*, Gray, Knows. Menag. 18.

Inhabits Sumatra. Mus. Leyden.

2. CAPRICORNIS BUBALINA. The THAAR or THAR.

Grey brown, blackish washed ; crown and dorsal line black ; thighs and outside of legs rufous ; nose, chin, inside of ear, lower part of mane and legs below the hocks whitish.

Antelope Bubalina, Hodgson, P. Z. S. 1832, 12.—*A. Thar*, Hodgson.—*Nemorhedus proclivis*, Hodgson.—*Capricornis Bubalina*, Gray, Knows. Menag. 18.

Inhabits India ; Nepal. Mus. Brit.

A head was sent to the United Service Museum by Lieut.-Colonel Childers, of the 11th Dragoons, in 1820, under the name of *Serow* or *Imo*. "It is not speedy, as might be inferred from its make. Its flesh is very coarse and bad. It is usually killed with poisoned arrows."—*Hodgson*, l. c. 14.

3. CAPRICORNIS? CRISPA. The JAPANESE GOAT ANTELOPE.

Fur very fine, elongate, rather woolly, crisp; brown or brownish; feet and ears darker; throat whitish: female paler; tear-bag a naked spot?

Antilope crisper, Temm. Faun. Japan. t. 18, 19.—*Capricornis crisper*, Gray, Knows. Menag. 18.

Inhabits Japan. Mus. Leyden.

**** Nose ovine, hairy, without any muffle; horns short, conical, recurved, ringed.**

24. NEMORHEDUS, part H. Smith; *Kemas*, Hodgson.

Horns short, conical, inclined and recurved, arising from behind the orbits; nose ovine, hairy; muffle none; tear-bag none; interdental pores large; fur short.

1. NEMORHEDUS GORAL. The GORAL.

Grey brown, black punctulated; streak on lower part of back of neck blackish; cheeks, chin and upper part of throat white; front of fore-legs blackish; feet rufous. Young paler; dorsal line rather darker.

Antilope Goral, Hardw. Linn. Trans. xiv. t. 14; Calcutta J. N. H. i. t. 12. f. 2, 3.—*A. Goral*, Hodgson.—*Bouquetin du Nepaul*, F. Cuv. Mam. Lith. t. . (copy from Hardw.)—*A. Duvaucellii*, H. Smith.—*Nemorhedus Goral*, H. Smith; Gray, Knows. Menag. 18.

Inhabits Nepal. Brit. Mus.

A. Duvaucellii (H. Smith) was described from a drawing traced from one of General Hardwicke's figures of this species, and badly coloured, which Duvaucel sent to Paris without any notes. It has no connection with *C. Sumatrensis*, to which many naturalists have referred it. In the Bengal Journal two Antelopes, said to resemble the *Goral*, are mentioned as found in Affghanistan, one called *Suja* and the other *Goomast*.

25. MAZAMA, Rafinesque; *Aplocerus*, H. Smith.

Horns small, conical, nearly erect, slightly inclined and recurved at the tip, ringed at the base; nose ovine, hairy; muffle none; tear-bag none; fur short, under fur woolly, outer very long, hairy and dependent.

1. MAZAMA AMERICANA. The MAZAMA or SPRINGBUCK.

White; horns, hoof and edge of nostrils black.

Rupicapra Americana, Blainv.—*Antilope Americana*, Desm.—*Capra Americana*, Rich. F. B. A. 268. t. 22.—*Oris montana*, Ord.—

Capra montana, Harlan.—*A. lanigera*, H. Smith.—*Mazama dorsata* and *M. sericea*, Rafin.—*A. Mazama* and *Apl. Femmamazama*, H. Smith.—*Capra?* *Columbiana*, Desmoul.—*Rock Mountain Sheep*, Jameson, Mem. Wern. Soc. iii. 306.—*Mazama Americana*, Gray, K. M. 19.

Inhabits N. America ; Rocky Mountains. Mus. Linn. Soc. and Zool. Soc.

26. RUPICAPRA, H. Smith ; *Capella*, Keys. & Blas. ; *Kemas*, Ogilby.

Horns elongate, slender, erect, recurved at the tip ; nose ovine, hairy ; muffle none ; fur soft ; skull without any pit, and with a minute suborbital fissure ; grinders without supplemental lobes, cutting-teeth equal-sized, erect.

1. RUPICAPRA TRAGUS. The CHAMOISE or GERUS.

Brown yellowish, with a dark dorsal streak in summer, blackish in winter.

Capra Rupicapra, Linn.—*A. Rupicapra*, Pallas ; H. Smith, G. A. K. t. 90.—*Rupicapra Tragus*, Gray, K. M. 19.—*R. Capella*, Bonap.—*R. pyrenaica*, Bonap.—*Tragus Dorcas*, Klein.—*Chamoise*, Buffon, H. N. xii. t. 16 ; F. Cuv. Mam. Lith. t. .

Inhabits S. Europe ; Switzerland, Pyrenees, and Pindarus. Brit. Mus.

I have compared the Swiss, Pyrenean and Greek specimens, and cannot find any character to separate them.

27. ANTILOCAPRA, Ord ; *Dicranocerus*, H. Smith ;
Oreammos, Rafin. ; *Cervus*, Blainv.

Horns erect, the base compressed with a flattened process in front, the end conical, recurved ; nose ovine, hairy ; muffle none ; fur very close ; hair stiff, coarse, flattened, wavy ; tail very short ; false hoofs none ; tear-bag none ; inguinal pores none ; legs rather slender than the other *Goat Antelopes* ; skull without any sub-orbital depression, but with a lengthened fissure ; grinders without supplemental lobes, cutting-teeth equal-sized and shelving.

1. ANTILOCAPRA AMERICANA. The CABRIT or PRONGHORN.

Pale fulvous ; upper part of rump white.

Antelope Americana, Ord, 1815.—*A. furcifer*, *A. palmata*, H. Smith, Linn. Trans. xiv. t. 2, 3 ; G. A. K. t. 178. t. 199. f. 1-5 ; Richards. Z. B. A. t. 21.—*Cervus hamatus*, Blainv.—*C. bifurcatus*, Rafin.—*Antilocapra Americana*, Ord ; Gray, K. M. 19.

Inhabits N. America ; in the plains in summer and in the mountains in winter. Called the *Goat*. Mexico (*Coulter*). Brit. Mus.

Dr. Coulter brought a head from Mexico which had the face dark brown, and the horns large, wide-spreading and much hooked at the tip, like the *A. palmata* of H. Smith (Proc. Zool. Soc. 1826, 121). This is probably only a larger variety in the summer fur.

II. The ANTELOPES OF THE DESERT. Nostrils bearded within beneath, operculated, far apart; horns on the frontal ridge; nose sub-cervine, with a small muffle; legs rather stout; tail elongate; hoofs rather large.

4. The EQUINE ANTELOPES have a very depressed, spongy and bristly muzzle.

28. CATOBLEPAS, Gray; *Connocætes*, Licht.; *Bos*, Forster.

Horns bent down on the sides, recurved at the tip; nose very broad, dilated, spongy, bristly; nostrils operculated; tail elongate, bushy, hairy from the base; hoofs compressed in front; teats four.

This genus has been placed with the Oxen by Forster, and in the Bovine group of genera by Sundevall, but it has all the characters of the true Antelopes in the proportion of its leg-bone.

* *Nose with a crest of reversed hair; chest maned.* Catoblepas.

1. CATOBLEPAS GNU. The GNU or KOKOON.

Nose with a tuft of reversed hair; chest maned. Brown or blackish; the lower part of the mane and tail often paler or white. Young: pale fulvous; nasal, gular, and nuchal mane black.

Antilope Gnu, Sparrm.; Zimmerm.—*Bos Connocætes*, Forster.—*Antilope taurina*, Burchell.—*C. Gnu*, H. Smith.—*C. taurina*, H. Smith, not A. Smith.—*Gnu*, F. Cuvier, Mam. Lith. t. ; Harris, W. A. A. t. 1.—*Catoblepas Gnu*, Gray, Knows. Menag. 19. t. 19. f. 1, young.

Var. Mane and tail black.

A. taurina, Burchell; A. Smith.

Inhabits S. Africa. Brit. Mus.

The *A. Gnu* of Burchell, H. Smith, F. Cuvier and Harris, "and the *Kokong* of Lichtenstein," has a white tail and mane. Burchell and H. Smith have given the name of *A. taurina* to the specimens, which have those parts black. When young they are fulvous, and become black as they reach maturity. The specimen of the *Kokoon* in the Museum of the London Missionary Society (Blomfield Street, Moorfields), named by Colonel H. Smith *Kokoon* (*Cat. taurina*, Griff. A. K. iv. 369, v. 368), is an adult common *Gnu*, *C. Gnu* (*Var.* mane and tail white; *Kokong*, Licht. Trav. Cape), and his description of Dr. Burchell's specimen in the British Museum agrees with the *Gnu*, in having the ridge of hair on the face. Indeed Dr. Burchell (Travels, ii. 278) appears to consider the difference between the *Gnu* and *A. taurina*, that the former has a white and the latter a black tail. Dr. Andrew Smith (Illust. Zool. S. A.) has regarded the *C. taurina* and *C. Gorgon* as the same species. Dr. Sundevall, in his Synopsis, has, by mistake, given the name of *C. taurina* to the *Gorgon*, or *Brindled Gnu* (*C. Gorgon*, H. Smith).

**** Nose with smooth hair ; chest not maned. Gorgon.**

2. CATOBLEPAS GORGON. The GORGON.

Face convex, smooth, covered with hair, lying towards the nose ; chest not maned ; black grey, varied and striped. Young : dark grey ; face, gular and nuchal mane and end of tail black. Half-grown : blackish ; crown grey.

Antelope Gorgon, H. Smith ; Harris, W. A. A. t. 4.—*Cat. taurina*, Sundev., not Burch. or Smith.—*Catoblepas Gorgon* or *Gorgon fasciatus*, Gray, Knows. Menag. 20. t. 19. f. 2, young.

Inhabits S. Africa. Brit. Mus.

Colonel H. Smith has figured a pair of horns which were in Mr. Brookes's Museum under the name of *C. Brookesii* (t. 201. f. 1). He thinks it is also probable that *Bos Pegaseus* (H. Smith, G. A. K. t. 204, from a drawing of Prince Maurice's) is a species of this genus (H. Smith, Jard. Nat. Lib.).

5. The BOVINE ANTELOPES have the nose moderately broad, with a moderate or small, bald, moist muffle ; the grinders are rather small, without supplemental lobes, the central cutting-teeth enlarged at the end.

29. BOSELAPHUS ; *Bubalis*, Licht., Ogilby ; *Acronotus*, H. Smith ; *Bubalus*, A. Smith ; *Alcelaphus*, Blainv. ; *Buselaphus*, Ray.

Horns lyrate, end suddenly curved at a nearly right angle, thick at base, on the upper edge of the frontal bones ; nose moderately broad, cervine ; muffle moderate, bald, moist ; tear-bag covered with a tuft of hair. Females : teats two.

1. BOSELAPHUS BUBALIS. The BUBALE.

Pale brown in early uniform ; rump like back.

Antelope Bubalis, Pallas.—*Capra Dorcas*, Houtt. t. 24. f. 3.—*Buselaphus Caji*, Ray.—*Bubalis Mauretanica*, Ogilby ; Sundevall.—*Acronotus Bubalis*, H. Smith.—*Bubale*, F. Cuv. Mam. Lith. t. .—*Cervine Antelope*, Penn.—*Boselaphus Bubalis*, Gray, K. M. 20. t. 20. f. 1, young.

Inhabits N. Africa. Brit. Mus.

Var. 1. Uniform pale brown ; with a dark brown streak down the outer side of the front of the fore-legs, like the streak on the leg of the *Lecama* or *Harte beast* from South Africa, which is not generally found in this species. This skin, without a head or hoofs, was brought by Mr. Frazer to the British Museum, from Tunis ; it probably indicates a third species, or perhaps this streak is only marked in the very adult or fully-coloured specimens.

2. BOSELAPHUS CAAMA. The LECAMA or HARTE BEEST.

Grey brown ; dorsal line, streak on face, outer side of limbs black ; large triangular spot on the haunches whitish.

Antelope Caama, Cuv. D. S. N. ii. 242 (1816) ; Harris, W. A. A. t. 7 ; A. Smith, Illust. Z. S. A. t. 31.—*A. Bubalis*, Licht. ; Erxleb.

291.—*Acronotus Caama*, H. Smith, G. A. K. t. 197.—*A. Dorcas*, Thunb.; Sparm. K. V. Hand. 1779, t. 5.—*Bubale*, Buffon, H. N. xii. t. 38. f. 2; Supp. iv. t. 15.—*Caama*, Cuvier, Menag. t. .—*Senegal Antelope*, Penn. Synn. 38.—*A. Senegalensis*, Cuvier, Dict. Sci. Nat., from Pennant.—*A. Koba*, Erxleb. Syn. 293, from Pennant.—*Boselaphus Caama*, Gray, Knows. Menag. 20. t. 20. f. 2, young. Inhabits S. Africa. Brit. Mus.

Pennant figures the head and horns of this species under the name of *Senegal Antelope*, and erroneously refers to Buffon's figures of the horns of the *Koba* as representing the species, which lead to some confusion; for the *A. Senegalensis* (Cuvier, Dict. Sci. Nat. ii. 235) is an abbreviation, and *A. Koba* (Erxleben, Syn. 293) is a translation, of Pennant's description of this species. Pennant's specimen is said to come from Senegal, but he describes the nuchal line and the knees as black, and the figure indicates the dark colour on the face of the Cape species.

30. **DAMALIS**; *Damalis acronotus*, sp. H. Smith; *Bubalis*, sp. Sundev.

Horns lyrate, diverging, subcylindrical; nose moderately broad, cervine, with a small, bald, moist muffle between and below the nostrils; tear-bag exposed: females, teats two.

* *Horns recurved above, diverging from the base; face dark in front.*

1. **DAMALIS LUNATUS.** The SASSAYBY.

Rufous glaucous, outer sides of the limbs dark.

Antelope lunata, Burchell, Trav. ii. 334, 335. fig. .—*Damalis (acronotus) lunatus*, H. Smith, G. A. K. t. 198; A. Smith, Zool. S. Afr. t. 31; Harris, W. A. A. t. 8.—*Bubalis lunata*, Sundev.—*Sassaybi*, Daniel, Afr. Scenery, t. .—*Damalis lunatus*, Gray, Knows. Menag. 21.

Inhabits S. Africa. Brit. Mus.

** *Horns regularly lyrate, nearly parallel at the base, then diverging, and approaching at the tips; face black marked; tear-bag moderate.*

2. **DAMALIS SENEGALENSIS.** The KORRIGUM.

Reddish grey; front of face from nose to occiput, a small spot behind the eyes, a small streak above the angle of the mouth, and streak on outside of the limbs above the knees, and tuft of the tail, black. Very young: uniform pale brown, without any dark marks.

Antelope and Damalis (acronotus) Senegalensis, H. Smith, G. A. K. v. t. 199. f. 3.—*Antelope Koba*, Children, in Denham and Clapperton's Travels, not Erxleben.—*Bubalis Koba*, Sundevall.—*B. lunata*, Sundev. Act. Stockh. 1842, 201, 243, not Burchell.—*A. Corrigum*, Ogilby.—*Damalis Senegalensis*, Gray, Knows. Menag. 21. t. 21.

Inhabits W. Africa; Gambia River, Macarthy's Island; called *Yonga* or *Yongah* by the Joliffs, and *Tan Rong* by the Mandingoes, Mr. Whitfield. Brit. Mus. Senegal? Sennaar. Mus. Stockholm.

In Denham and Clapperton's Travels I regarded this species as the *Koba* of Buffon, and H. Smith and Dr. Sundevall are of the same opinion: but on comparing the six pairs of horns of this species which I have been able to examine with Buffon's figure and descriptions, I find them all longer and much thicker at the base than Buffon describes them; the thinner (a female?) being 7 and the others 9 or 9½ inches in circumference, while that which Buffon described is only 5 inches. The rings are also more elevated, and reach nearer to the top than in Buffon's figure. All the characters lead me to believe that the horns figured as those of the *Koba* by Buffon belong to *Damalis Pygarga*. They afford very good venison.

Colonel Hamilton Smith, in 'Griffith's Animal Kingdom,' described and figured the heads brought home by Messrs. Denham and Clapperton as *A. Senegalensis*, but they are different from the one so called by Cuvier. Mr. Ogilby, in the 'Proceedings of the Zoological Society' (1826, 103), proposed to call these heads, *A. Corrigum*.

Under the name of *Antilope Koba*, Schinz (Syn. Mam. ii. 407) combines the *A. defassa*, Rüppell, *Damalis Senegalensis* and *Antilope adenota*, H. Smith, the *Koba* of Buffon, and the *Antilope Koba* or *Caama* of Erxleben.

*** Horns regularly lyrate, parallel at the base; face of adult white.

3. DAMALIS PYGARGA. The BONTE BOC.

Purple red, outside of limb dark; rump and face white: *faun* pale yellowish brown.

Antilope Pygarga, Pallas.—*Bonte Boc* or *Pied Antelope*, *Gazella Pygarga*, Harris, W. A. A. t. 17.—*Bubalis Pygarga*, Sundev.—*A. Dorcas*, Pallas.—*Antilope (Gazella) Pygarga*, H. Smith.—*Damalis Pygarga*, Gray, Knows. Menag. 21. t. 20. f. 3, young; t. 22. f. 2 & 3, adult.

Half-grown, face whitish.

A. personata, Wood, Zool. Journ. ii. t. .

Inhabits S. Africa. Brit. Mus.

Male: bright purple red, face whitish, dark-edged, with a dark-edged white streak to between the horns; legs whitish, upper and lower part brown varied; temple and upper part of the throat whitish; rump to above the tail pure white; tear-bag round, distinct, moist. The female is similar, but the throat and under part of the body are white. These animals are often brought to the Cape market for food.

4. DAMALIS ALBIFRONS. The BLESS BOCK.

Purplish red; face and back of thighs white; rump like back.

Bless bok or *Antilope albifrons*, Burchell, Trav. ii. 335?; Harris, W. A. A. t. 21.—*Bubalis albifrons*, Sundev.—*Damalis albifrons*, Gray, Knows. Menag. 22. t. 22. f. 1, half-grown.

Inhabits S. Africa.

A half-grown specimen was darker, with a pale spot between the horns, separated by a dark spot from the white on the face; the

temple was white, with a white spot; the legs had a brown stripe down the outer side of the front; and the throat and rump brown, the latter without any white spot.

Dr. Burchell, when speaking of the *Bless bock*, proposed to call it *A. albifrons*, as the name *Pygarga* has been used for both the *Springer* and the *Bless bock*; but it is not certain if he intended by *Bless bock* this or the preceding species. Captain Harris's figure shows the distinction of the species.

**** *Horn unknown.*

5. DAMALIS? ZEBRA. The DORIA.

Bright golden brown, with numerous black cross bands narrowing at the sides; outer sides of fore and hind legs dark.

Antelope Zebra, Gray, Ann. Nat. Hist. 1836.—*A. Doria*, Ogilby, P. Z. S. 1836, 121; Frazer, Z. T. t. —*A. Zabrata*, Robert.—*Viverra Zebra*, Whitfield's MSS.—*Cephalophus? zebra*, Gray, Cat. Mam. B. M.—*Damalis? zebra*, Gray, Knows. Menag. 22.

Inhabits W. Africa; Gambia. Brit. Mus.

Skins without head and feet are alone known; they are brought down by the negroes. In the Catalogue of the Mammalia in the British Museum I have referred this species with doubt to *Cephalophus*. Mr. Ogilby (P. Z. S. 1836, 121) thinks it should be referred with the Harness Antelopes to *Calliope*. I am inclined, on account of the dark mark on the outside of the limb, to think it belongs to the genus *Damalis*. Mr. Whitfield believes it to be a species of *Viverra*.

THE STREPSICERES.

The animals of this family are peculiar as being the only hollow-horned or Bovine Ruminants which are marked with white stripes and spots. The bands are not very distinct in the *Impoofa* or *Eland*, but they are easily to be observed in the female, if it is looked at obliquely, which was brought home by Burke, and presented to the British Museum by the Earl of Derby. Their nostrils are near together in front. They have four teats in a small udder. The horns generally incline backwards from their base; the skull, which somewhat resembles that of the Deer, has a rather small nasal opening, no suborbital pit, and only a small suborbital fissure.

Colonel H. Smith forms of the larger species three of his four subgenera of *Damalis*: he places the smaller kinds as a subgenus (*Tragelaphus*) of Antelopes.

Prof. Sundevall placed the genera I have here brought together in two different families; the genus *Portax* with the *Bovina*, and the others in the *Sylvicaprina*, or True Antelopes.

The AFRICAN GENERA have large heavy horns, only the rudiments of a tear-bag, and their limbs are nearly equal; they have no supplementary lobes to the grinders, and the central cutting-teeth are enlarged above.

a. *The nose hairy, cervine, with only a small moist naked space between the edges of the nostrils, and a narrow streak on the upper lip; the body is large, heavy; the neck is maned.*

1. STREPSICEROS, H. Smith; *Calliope*, Ogilby; *Tragelaphus*, sp. Blainv.

Horns large, heavy, spirally twisted, keeled in front; tear-bag a naked space; throat with a central, linear mane: female hornless.

1. STREPSICEROS KUDU. The ECHLONGOLE or KOODOO.

The horns diverge from the line of the forehead, and have two twists; the calf is marked like the adult.

Antelope Strepsiceros, Pallas.—*Damalis (Strepsiceros) Strepsiceros*, H. Smith, G. A. K.—*A. Tendal*, Rüppell, Abyss. 22; Fischer, Syn. 475.—*Strepsiceros Kudu*, Gray, Cat. B. M.; Knowsley Menag. 26. t. 24. f. 2, young.—*S. Capensis*, Harris, W. A. A. t. 20.—*S. excelsus*, Sundev.—*Striped Antelope*, Penn.—*Comdoma*, Buffon, H. N. xii. t. 39; Supp. vi. t. 13.

Inhabits S. Africa. Mus. Brit.

Var. Smaller.

Inhab. Abyssinia. Mus. E. India Company, adult. Mus. Frankfurt, adult and young.

2. OREAS, Desm.; *Boselaphus*, sp. Blainv., Gray; *Damalis (Boselaphus)*, sp. H. Smith; *Damalis*, Sundev.

Horns large, erect, slightly curved, with a spiral keel; throat with a longitudinal, crested dewlap; hoofs narrowed in front. Female with smaller, thinner horns.

I formerly adopted the name of *Boselaphus*, which Blainville had used for the genus, but Ray had previously applied this name to the *Bubale*, and Desmarest has formed a subgenus specially for it under the name of *Oreas*.

1. OREAS CANNA. The IMPOOFO or ELAND.

Pale brown; throat and beneath whitish.

Antelope Oreas, Pallas.—*Damalis (Boselaphus) Oreas*, H. Smith, G. A. K. t. 200.—*A. Oryx*, Pallas, Misc. 9.—*D. Boselaphus Canna*, H. Smith, G. A. K. t. 181. f. 5, horn ♂.—*Oreas Canna*, Gray, Knows. Menag. 27. t. 26, 27.—*Coudou*, Buffon, H. N. xii. t. 46 b.—*Canna*, Buffon, Supp. iii. t. 12.—*Eland*, Kolbe, Sparmann, K. Vet. Handl. 1779, t. 8; Harris, W. A. A. t. 6; Daniel, Afr. Scen. t. .

Inhabits S. Africa; Cape of Good Hope (*Sparmann*). Brit. Mus.

This Antelope has much the character of the Oxen, and Dr. Burchell informs me that it is the best food of any of the genus at the Cape, being the only one which is moist and has any fat intermixed with the muscle; the flesh of the others is dry and hard. At Knowsley it breeds with the facility of domestic cattle, but they are ravenous feeders, and appear liable to an epidemic.

It should be remarked that the skin of the specimen shot by Burke

at the Cape (the female especially) shows several pale whitish cross-bands on the hinder half of the body, similar to the streaks on the *Koodoo*, showing the affinity of this animal to that species; but I could not observe these bands in the living specimens at Knowsley Park.

2. *OREAS DERBIANUS*. The GING-E-JONGA.

Pale reddish brown; front of the face, the neck, the front part of the under side, a spot on the front and hinder side of the upper part of the fore-leg, the dorsal streak, dark black; the belly, the front and back edge of the upper part of the legs and under side of tail whitish; a broad half-collar in front of the shoulder, narrowed above; fourteen or fifteen narrow, waved, perpendicular streaks on each side of the body white; withers with intermixed black hairs: female, throat dark brown; crown reddish brown.

Boselaphus Derbianus, Gray, Ann. and Mag. N. Hist. xx. 286; Silliman's Amer. Journ. v. 279.—*Oreas Derbianus*, Gray, Knowsley Menag. 27. t. 25.

Inhabits W. Africa; river Casaman. Called *Ging-e-jonga*. Mr. Whitfield. Brit. Mus. Imperfect skin of male and female, and horns.

b. *The nose bovine, with a large coriaceous moist muffle, and a narrow bald space on the upper lip. The animals have very slender, elegant legs; small hoofs and false hoofs; conical, subangular horns; with an oblique, indistinct keel.*

3. *TRAGELAPHUS*; *Antelope (Tragelaphus)*, Blainv., H. Smith.

Horns conical, subangular; tear-bag distinct; nape and back with a more or less distinct mane: they are brown; with spots on haunches, crescent on chest, and inside of legs white, and a dark dorsal stripe.

* *Face with a curved band between the eyes; horns large; back cross-banded. Euryceros.*

1. *TRAGELAPHUS EURYCEROS*. The EURYCEROS.

Head pale brown; broad band before the eyes, and two large spots on cheeks, chin and front of upper lip white; horns elongate, thick, scarcely bent forward at the tip; throat with long black hairs.

Antelope Eurycerus, Ogilby, P. Z. S. 1836, 120.—*A.*, n. sp., Afzelius, N. Act. Upsal. vii. 269. t. 8. f. 3; H. Smith, G. A. K. v. 361.—*Tragelaphus Euryceros*, Gray, Knows. Menag. 27. t. 23. f. 1, horns.

Inhabits W. Africa. Horns in Brit. Mus. and Zool. Soc.

2. *TRAGELAPHUS ANGASII*. The INYALA.

Black; back with a dorsal streak and four or five bands on each side; head blackish; narrow band before eyes, two small spots on cheeks, front of upper lip and chin white; forehead and feet bay; throat with a mane of long rigid blackish hair; horns rather slender, elongate, rather bent forward at the tip; female bay, with many white bands.

Tragelaphus Angasii, Gray, P. Z. S. 1848, 89. t. 4 & 5, male, female and young; Knows. Menag. 27.

Inhabits S. Africa; Port Natal. Brit. Mus. male, imperfect skin.

** Face without any frontal streak; horns small.

† Back with transverse white stripes.

3. TRAGELAPHUS SCRIPTUS. The ZALOFES or HARNESS ANTELOPE.

Pale bay; back with four cross-bands and a central white streak; haunches white spotted; cheek with two white spots; spot on chest, nose, feet, and spots on the legs blackish; dorsal streak and end of tail black. Adult: chest and outside of shoulder and haunches and legs black; the male with a high ridge of long, coarse white hair extending the whole length of the back to the tail.

Antelope scripta, Pallas, Misc. 8.—*Antelope (Tragelaphus) scripta*, H. Smith.—*A. maculata*, Thunb.—*A. (Tragelaphus) Phalerata*, H. Smith.—*Tragelaphus scripta*, Gray, Knows. Menag. 28. t. 28.—*The Harness Antelope*, Pennant, Syn. 27.—*Guib*, Buffon, H. N. xii. 305, 307. t. 40. t. 41. f. 1; F. Cuv. Mamm. Lithog. t. ; Dict. Sci. Nat. t. .

Inhabits W. Africa; Senegal and Gambia. Called *Oualofes* or *Zalofes*.

The dark colour of the chest and outside of the limbs, and the high crest of the male, are not developed until they are four or more years old.

This species varies in some having seven and others nine white cross-bands, and some are spotted and others not; but they breed together, and the produce is often a different variety from the parent.

They breed constantly at Knowsley: in May 1845 they had a small herd of two males and four females, three of which were expected to bear young.

4. TRAGELAPHUS DECULA. The DECULA.

Grey brown; back with three or four indistinct cross-bands; an arched streak on upper part of side, a few spots forming an arch on the haunches; dorsal line, streak on nose, and in front of fore-legs blackish.

Antelope Decula, Rüppell, Abyss. t. 4.—*Tragelaphus Decula*, Gray, Knows. Menag. 28.

Var. Back without the cross-bands.

Inhabits Africa; Abyssinia (*Rüppell*).

†† Back without any cross-bands or lateral streak.

5. TRAGELAPHUS SYLVATICUS. The BOSCH BOG.

Blackish brown; head pale brown; back, across forehead, black; small spot on haunches, larger spot on insides of legs and on feet white; dorsal line longly crested, black, white varied in. Female paler brown. Young: pale bay.

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Antelope sylvatica, Sparmann, Act. Holm. iii. t. 7.—*Tragelaphus sylvatica*, Harris, W. A. A. t. 26; Gray, Knowsley Menag. 28.—*Forest Antelope*, Pennant.

Inhabits S. Africa; Cape of Good Hope. Brit. Mus.

Var.? Smaller horns, rather more erect.

Antelopus Ronleyni (the *Serolomoot broque*), Ronaleyn; G. Cumming, Hunter's Life S. A. ii. 178, 179.

Inhabits Limpopo.

The two pairs of horns, named by Colonel H. Smith *Boselaphus canna* (*a*, *b*, in the List of Mamm. Brit. Mus. 155); one, presented by Dr. W. Burchell, is certainly the horns of this species, and the other appear to be those of a young male, *Strepsiceros Kudu*.

The ASIATIC STREPSICERES have a bovine nose, with a large coriaceous moist muffle extending over the whole front of the upper lip; small, short, angular horns; a deep longitudinal tear-bag; and the hind-legs much shorter than the fore-ones; the skull without any suborbital pit, and only a minute fissure; and with supplementary lobes to the grinders.

4. PORTAX; *Oreas*, sp. Fischer; *Tragelaphus*, Ogilby;
Damalis (Portax), H. Smith.

Horns short, conical, angular, with an obscure oblique ridge; tear-bag deep, longitudinal; shoulders higher than the rump.

1. PORTAX TRAGOCAMELUS. The NYLGHAU.

Grey; under surface, rhombic spot on the forehead and above the hoofs black and white ringed; tail, end black. Female browner. Young: dull reddish fawn; lower part of fore-legs brighter; under lip, spot on jaws, and line along belly on inside of legs and fore-part of hock, white; tip of tail, line on back of nose and on front of legs black.

Antelope Trago-camelus, Pallas, Misc. 5.—*A. picta*, Pallas, Spicil. xiii. 54; Gray, Cat. B. M.—*A. albipes*, Erxl. 280.—*A. leucopus*, Zimm. Zool. 541.—*Damalis* (Portax) *Risia*, H. Smith.—*Portax picta*, Gray, Cat. B. M.—*P. Tragocamelus*, Gray, Knows. Menag. 28. t. 29.—*Tragelaphus Hippelaphus*, Ogilby.—*P. Tragelaphus*, Sundev.—*Biggel*, Mandelst. Reise (1658), p. 122.—*Tragelaphus Caii*, Raii Syn. 82?; Parsons, Phil. Trans. No. 476. p. 465. t. 3. f. 9.—*Nylghau*, Hunter, Phil. Trans. lxi. 170. t. 5.—*Nilghaut*, Buffon, H. N. Supp. v. t. 10, 11; F. Cuv. Mamm. Lithog. t. —*Indostan Antelope*, Penn. Syn. 29.—*White-footed Antelope*, Penn. Syn. 29. t. 6. f. 1, 2.

Inhabits India. The *Roou* of the Mahrattas, the *Nylghau* of the Persians.

This species has bred at Knowsley. In December 1845 they had two calves, both females, making a flock of one male and four females: they are in the paddock with the *Eland* in summer. They have also bred in the Gardens of the Zoological Society (See *P. Z. S.* 1831, 37), and in the Menagerie of Sir Robert Heron at Shibton.

2. A MONOGRAPH OF SCARABUS, A GENUS OF AIR-BREATHING GASTEROPODOUS MOLLUSCA; FROM SPECIMENS IN THE CUMINGIAN COLLECTION. BY ARTHUR ADAMS, R.N., F.L.S. ETC.

SCARABUS, Montfort.

Testa ovata, spira subobtusa, anfractibus compressis, varice utrinque instructis; apertura ovali intus utrinque dentata; peristomate non continuo, labro simplici, subexpanso.

The *Scarabi* have the eyes sessile on the inner bases of the tentacles, which are short and annulated; they live like most of the other genera of *Auriculidæ*, in the damp woods and mangrove marshes. None have been found in the African or American regions, but all the species at present known are from the East Indies.

SCARABUS IMBRIUM, Montfort, Conch. Syst. vol. i.; Férussac, Prodrome, p. 101; Chemnitz, Conch. vol. ix. pl. 136. fig. 1249 & 1250.

Helix scarabæus, Linn.—*Helix pythia*, Müller.—*Bulimus scarabæus*, Bruguière.—*Auricula scarabæus*, Lamarck.

S. testâ ovato-pyramidali, rufo-fusco variegatâ, longitudinaliter valdè striatâ; spirâ acuminatâ; aperturâ subrotundatâ, spiram æquante; labro posticè inflexo.

Shell ovately pyramidal, variegated with red-brown, longitudinally strongly striated, spire acuminated; aperture subrotundate, as long as the spire; outer lip posteriorly inflexed.

Hab. Island of Bohol, Philippines; in dry woods, under stones, and in earth; *H. C.* (Mus. Cuming.)

The large size, pyramidal form and strongly striated epidermis are peculiar to this species: the upper tooth on the inner lip is more triangular, and the posterior part of the outer lip is more inflexed than in *S. Lessoni*.

SCARABUS LESSONI, Blainville, Dict. Sci. Nat. pl. 48. fig. 32; Lesson, Voy. de la Coquille, vol. ii. p. 334. pl. 10. fig. 4.

Auricula Petiveriana, var. *Deshayes*.

S. testâ ovatâ, longitudinaliter substriatâ, rufo-castaneo variegatâ; spirâ lateribus concavis; aperturâ oblongâ, spirâ longiore; labio subplano, labro posticè arcuato.

Shell ovate, longitudinally substriated, variegated with chestnut-red; spire with the sides convex; inner lip rather flattened, outer lip posteriorly arcuated.

Hab. New Ireland; *Hinds*. (Mus. Cuming.)

The oval form and oblong mouth render this species easily distinguished from *S. imbricum*: the upper tooth on the inner lip is longer, and two of the five teeth in the outer lip are more prominent than the others.

SCARABUS PETIVERIANUS, Férussac, Prodrôme, p. 101 ; Petiver, Gazophylacia Naturæ, pl. 4. fig. 10.

Cochlea Bengalensis, *Petiver*.—Auricula Peteveriana, *Desh.*

S. testâ ovato-oblongâ, læviusculâ, longitudinaliter tenuissimè striatâ, albâ castaneo variegatâ ; aperturâ spiram æquante ; labro arcuato.

Shell ovately oblong, rather smooth, longitudinally very finely striated, whitish, variegated with chestnut-brown ; aperture as long as the spire ; outer lip arcuated.

Hab. Borneo ; Cagayan, province of Misamis ; Mindanao ; in damp woods, under decayed leaves ; *H. C.* (Mus. Cuming.)

This species is characterized by its smaller size, more ovate form, smoother epidermis, the arcuated outer lip, and rotundate aperture.

SCARABUS TRIGONUS, Troschel, Wiegmann's Archiv, 1840.

S. testâ triangulari, rufo-fusco marmoratâ, anfractu ultimo transverso gibbo angulato, aperturâ angustatâ, labro valdè reflexo.

Shell triangular, marbled with red-brown, last whorl transverse, gibbous, angulated ; aperture narrowed ; outer lip greatly reflected.

Hab. Sarsogon ; Luzon ; dense woods, damp places ; *H. C.* (Mus. Cuming.)

The triangular form, approaching that of *Tomogerus*, at once distinguishes this species : the middle tooth on the inner lip is double, the upper tooth prominent : there are five teeth in the outer lip, two being more prominent than the others.

SCARABUS PLICATUS, Férussac, Prodrôme, p. 101 ; Chemn. Conch. vol. ix. pl. 136. fig. 1252, 1253.

Helix scarabæus, var. Chemn.—Auricula plicata, *Deshayes*.—*Scarabus triangularis, Benson.*

S. testâ subtriangulari, obliquâ, gibbosâ, spirâ brevi, acuminatâ, lateribus concavis, anfractu ultimo posticè gibboso anticè subangulato distorto, epidermide longitudinaliter obliquè striatâ, castaneâ, fasciis pallidis confusè ornatâ ; aperturâ angustâ, labio anticè flexuoso, labro arcuato, anticè valdè dilatatâ, reflexâ, rimâ umbilicali longâ transversâ.

Ashy or chestnut-brown, with pale, rather indistinct bands ; much larger and more triangular than *S. Borneensis*, with the outer lip regularly arcuated.

Hab. India ; *Benson.* Jaffna, in saline marshes ; *Dr. Gardner.* (Mus. Cuming.)

SCARABUS STRIATUS, Reeve, Ann. & Mag. Nat. Hist. 1842, vol. ix. p. 220. fig. 9.

Auricula scarabæus, *Quoy, Voy. de l'Astrolabe, Zool.* vol. ii. p. 162. pl. 13. f. 24.

S. testâ ovato-trigonalî, fusco variegatâ, longitudinaliter valdè striatâ ; spirâ acuminatâ ; labio antico subflexuoso.

Shell ovately trigonal, variegated with brown, longitudinally strongly striated; spire acuminate; inner lip anteriorly subflexuose.

Hab. San Nicholas, island of Zebu; *H. C.* (Mus. Cuming.)

The sharp-pointed spire, striated epidermis and flexuous inner lip, distinguish this form: in the outer lip two of the teeth are more prominent than the others, the intermediate ones being more or less divided or bifid.

SCARABUS CECILLII, Philippi, Zeitsch. für Malacol. 1847, August.

S. testâ orato-oblongâ, læviusculâ, tenuissimè in longum rugatâ, cornedâ; anfractu ultimo interdum castaneo, superius corneo bifasciato; epidermide lineis obscuris ziczac-formibus, punctisque, marmoratâ.

Shell ovately oblong, rather smooth, longitudinally very finely rugose, horn-coloured, last whorl chestnut-coloured, with two horn-coloured bands superiorly; epidermis ornamented with zigzag reticulated lines and punctures.

Hab. China. (Mus. Cuming.)

The reticulated epidermis, narrow ovoid form, and angulated outer lip are peculiar to this species; the aperture is oblong, equal to the spire; the outer lip below the angle is rectilinear, and but three teeth are visible in the outer lip.

SCARABUS UNDATUS, Lesson, Voy. de la Coquille, Zool. vol. ii. p. 336. pl. 10. f. 6.

Auricula scarabæus, var. Desh.

S. testâ oratâ, fuscâ, longitudinaliter valdè striatâ; striis undulatis subdecussantibus; anfractu ultimo posticè gibboso; labio arcuato, valdè reflexo.

Shell ovate, fuscous, longitudinally strongly striated; striæ undulated, posteriorly decussating; last whorl posteriorly gibbous; outer lip arcuated, greatly reflected.

Hab. —? (Mus. Cuming.)

The waved elevated lines which cross each other irregularly on the back, and the last whorl posteriorly tumid, will characterize this species: the upper tooth is large and elongated on the inner lip, and the lower tooth of the outer lip is rather lamelliform.

SCARABUS PYRAMIDATUS, Reeve, Ann. & Mag. Nat. Hist. 1842, vol. ix. p. 221. fig. 12.

S. testâ ovato-pyramidalî, pallidâ, aurantio-fusco variegatâ, longitudinaliter substriatâ; aperturâ aurrâ, labio circulari.

Shell ovately pyramidal, pallid, variegated with orange-brown, longitudinally somewhat striated; aperture golden orange, outer lip circular.

Hab. New Ireland; *Hinds.* Solomon's Islands; *Capt. d'Orville.* (Mus. Cuming.)

The pyramidal form, golden aperture, and light yellow-brown markings distinguish this species, though some specimens are much more ovate than others: the peritreme is double and thickened, the middle

tooth of the inner lip is simple and thickened, and in the outer lip two of the teeth are large and conspicuous.

SCARABUS CUMINGIANUS, Petit.

S. testá ovato-trigóná, fuscá, longitudinaliter substriatá; anfractu ultimo valdè varicoso; aperturá aeratá, labio calloso, labro valdè posticè sinuato.

Shell ovately trigonal, brown, longitudinally substriated; last whorl strongly varicose; aperture copper-coloured; inner lip callous, outer lip posteriorly sinuated.

Hab. Boljoon, island of Zebu, Philippines; in earth, among decayed coral in the woods. (Mus. Cuming.)

The upper tooth on the inner lip is thickened with a calcareous deposit; the middle tooth is prominent, with a callosity at the lower part: on the outer lip three of the teeth are very prominent, the others are obsolete; the varix on the last whorl is very prominent; the umbilical fissure is wide and deep.

SCARABUS LEKITHOSTOMA, Reeve, Ann. & Mag. Nat. Hist. 1842, vol. ix. p. 220. fig. 6.

S. testá oratá, imperforatá, solidá, fusco variegatá; aperturá aurantiacá, labio incrassato, labro duplicato, posticè subsinuato.

Shell ovate, imperforate, solid, variegated with brown; aperture golden orange; inner lip callous, thickened, outer lip double, posteriorly somewhat sinuated.

Hab. — ? (Mus. Cuming.)

The middle tooth of the inner lip is double; in the outer lip there are three prominent teeth, the two posterior being approximated; there is no umbilicus, and the spire is concave at the sides; the back, moreover, is strongly plicated near the sutures.

SCARABUS CASTANEUS, Lesson, Voy. de la Coquille, Zool. p. 336. pl. 10. fig. 7.

S. testá oblongá, ovato-pyramidalí, læviusculá, longitudinaliter substriatá, castaneá; spirá elevatá, acuminatá; aperturá oblongá, spiram æquante, labro semicirculari.

Shell oblong, ovately pyramidal, rather smooth, longitudinally substriated, chestnut-brown; spire elevated, acuminate; aperture oblong, as long as the spire, outer lip semicircular.

Hab. Sibonga, island of Zebu, in the woods; *H. C.* (Mus. Cuming.)

This is a smooth, oblong shell, with a regularly arched outer lip with four teeth within it, two of which are much larger than the others.

SCARABUS POLLEX, Hinds, Zool. Voy. Sulphur, Moll. p. . pl. 16. fig. 9, 10.

S. testá oratá, compressá, fusco-castaneá, longitrorsum valdè striatá, anfractu ultimo confusè fasciato.

Shell ovate, compressed, chestnut-brown, longitudinally strongly striated, last whorl indistinctly banded.

Hab. Feejee Islands; *Hinds.* (Mus. Cuming.)

Distinguished from *S. Lessoni* by its coarsely striated surface and different markings; and from *S. castaneus* by its larger size and darker colour, in being more striated, and by two dark yellowish bands on the upper part of the last whorl.

SCARABUS SEMISULCATUS, A. Adams. *S. testâ ovato-pyramidalî, læviusculâ, rufo-castaneâ, longitudinaliter vix striatâ, anfractibus convexiusculis semisulcatis, fasciâ nigricante prope suturam; aperturâ subrotundatâ; labio crasso, anticè rotundatâ, dilatatâ; labro semicirculari, posticè subsinuato.*

Shell ovately pyramidal, smooth, reddish dark chestnut colour, longitudinally slightly striated; whorls rather convex, semisulcated, with a blackish band near the sutures; aperture rather round; inner lip thickened, anteriorly rounded and dilated; outer lip semicircular, posteriorly somewhat sinuated.

Hab. — ? (Mus. Cuming.)

A pyramidal, smooth, dark-brown shell, with the whorls strongly sulcated longitudinally near the sutures; two of the teeth in the outer lip are much larger than the others, and the inner lip is rounded and thickened in front; the umbilicus is large and deep.

SCARABUS SINUOSUS, Adams. *S. testâ ovato-oblongâ, flavescenti nigro-fusco maculatâ; epidermide tenuissimè longitudinaliter substriatâ; spirâ obtusâ, lateribus convexis; aperturâ oblongâ; labio anticè rotundato, reflexo; labro posticè valdè sinuoso, in medio inflexo, peritremate incrassato.*

Shell ovately oblong, yellowish, spotted with blackish brown; epidermis very finely longitudinally substriated; spire obtuse, the sides convex; aperture oblong; inner lip anteriorly rounded, reflexed; outer lip posteriorly strongly sinuated, inflexed in the middle, peritreme thickened.

Hab. Island of Negros, Philippines. (Mus. Cuming.)

The posterior tooth of the inner lip is elongated, the middle tooth double; in the outer lip three of the teeth are prominent, the two posterior being approximated; the umbilicus is partly closed by the reflection of the inner lip.

SCARABUS IMPERFORATUS, A. Adams. *S. testâ ovatâ, compressâ, imperforatâ; spirâ brevi, acuminatâ, lateribus concavis, læviusculâ, longitudinaliter tenuissimè substriatâ, lutescenti fusco-castaneo variegatâ, anfractu ultimo posticè subangulato; aperturâ oblongâ; labio anticè excavato, reflexo, labro semicirculari.*

Shell ovate, compressed, imperforate; spire short, acute, sides concave, rather smooth, longitudinally very finely substriated, yellowish, variegated with light chestnut, last whorl somewhat angulated posteriorly; aperture oblong; inner lip anteriorly flattened, excavated, reflexed; outer lip semicircular, umbilicus closed.

Hab. Borneo. (Mus. Cuming.)

The last whorl is posteriorly gibbous; the umbilicus is closed by the inner lip; three of the teeth in the outer lip are prominent, the two posterior approximated.

SCARABUS PANTHERINUS, A. Adams. *S. testá ovato-pyramidalí, tenui, læviusculá, longitudinaliter substriatá, lutescenti, maculis rufo-fuscis ornatá; spirá acuminatá, lateribus convexis; aperturá oblongá, labio anticé rotundato, reflexo, labro semicirculari.*

Shell ovately pyramidal, thin, rather smooth, longitudinally substriated, yellowish, ornamented with red-brown spots; spire acuminate, the sides convex; aperture oblong, inner lip anteriorly rounded and dilated, outer lip semicircular.

Hab. Siquejor; Philippines, woods, under stones. (Mus. Cuming.)

The aperture is yellowish white; three of the teeth in the outer lip are more prominent than the others, the intermediate ones being sometimes double; the umbilicus is large and deep.

SCARABUS BORNEENSIS, A. Adams. *S. testá ovato-pyramidalí, luteo-fuscí, castaneo confusé fasciatá, læviusculá; epidermide tenuissimé, longitudinaliter striatá; aperturá oblongá, angustá, spiram subæquante, anfractu ultimo infernè subangulato; foveá umbilicali angustá, transversá.*

Shell ovately pyramidal, yellowish brown, obscurely transversely banded, rather smooth, very finely longitudinally striated; aperture oblong, narrow, nearly as long as the spire, last whorl inferiorly subangulated; umbilical fissure narrow, transverse.

Hab. Borneo; *Lieut. Taylor.* (Mus. Cuming.)

This species is narrower and more ovate than *S. plicatus*, of a much smaller size; the outer lip is rectilinear in the middle; the teeth of the outer lip are connected by an elevated ridge, and three of the teeth are more prominent than the others.

SCARABUS CHALCOSTOMUS, A. Adams. *S. testá ovato-pyramidalí, spirá elevatá, acutá, longitudinaliter substriatá, pallide luteá, rufo-fuscí variegatá; aperturá ovali, ænéá; labio anticé subrecto; labro semicirculari; umbilico patulo.*

Shell ovately pyramidal, spire elevated, sharp, longitudinally substriated, pale yellow varied with reddish brown; aperture oval, brassy; inner lip anteriorly rather straight, outer lip semicircular; umbilicus open.

Hab. Solomon's Islands; *Capt. D'Orville.* (Mus. Cuming.)

In general appearance this species resembles *S. pyramidatus*, but it is more oval, larger, lighter, with the middle tooth on the inner lip double, and the lower tooth broad and ascending; two of the teeth in the outer lip are very large and tubercular.

3. A MONOGRAPH OF PHOS, A GENUS OF GASTEROPODOUS MOLLUSCA. BY ARTHUR ADAMS, F.L.S., R.N.

PHOS, Montfort.

Shell ovately fusiform, spire acuminate, whorls longitudinally ribbed and cancellated; columella with a single anterior plait; outer lip notched in front, striated within. The animal has a small head;

the tentacles connate at the base, with the eyes near their distal third; the foot is dilated in front, forming an elevated shield, acutely auriculate on each side, pointed behind, and ending in a single long filament. Operculum small, horny, and unguiform. In three species of this genus in which I have observed the animal, namely *Phos senticosus*, *roseatus*, and *Blainvillii*, the hind part of the foot terminated in a single median filament, and not, as in *Nassa*, in a bifurcate tail.

1. *PHOS SENTICOSUS*, Linn. sp.; List. Pl. 967. fig. 22.
Buccinum senticosum, Linn.
Phos senticosus, Montfort.
Hab. Philippine Islands; *H. C.*
2. *PHOS BLAINVILLII*, Desh. Chemn. pl. 125. f. 1201, 1202.
 Kiener, Mon. Buccinum, pl. 11. f. 38.
Buccinum pyrostoma, Reeve.
Hab. Philippine Islands; *H. C.*
3. *PHOS CUMINGII*, Reeve, Elements of Conchology, pl. 3. fig. 16.
Hab. — ?
4. *PHOS CRASSUS*, Hinds, Zool. Voy. Sulphur, Moll. p. 37. pl. 10. f. 1, 2.
Hab. Panama, Gulf of Fonseca.
5. *PHOS VIRGATUS*, Hinds, *l. c.* p. 37. pl. 10. fig. 11, 12.
Hab. Ceylon.
6. *PHOS RETECOSUS*, Hinds, *l. c.* p. 37. pl. 10. fig. 3, 4.
Hab. Ceylon.
7. *PHOS VERAGUENSIS*, Hinds, *l. c.* p. 37. pl. 10. fig. 13, 14.
Hab. Pueblo Nueva, west coast of Veragua.
8. *PHOS ARTICULATUS*, Hinds, *l. c.* p. 38. pl. 10. fig. 7, 8.
Hab. Panama.
9. *PHOS ROSEATUS*, Hinds, *l. c.* p. 38. pl. 10. fig. 9, 10.
Hab. North coast of Sumatra.
10. *PHOS GAUDENS*, Hinds, *l. c.* p. 38. pl. 10. fig. 5, 6.
Hab. Gulf of Tehuantepec, west coast of Mexico.
11. *PHOS CANCELLATUS*, A. Adams. *P. testâ ovato-fusiformi, albâ, obsolete fusco fasciatâ; anfractibus subrotundatis, lineis elevatis longitudinalibus et transversis, valdè cancellatis, cancellis ad angulos acutè nodosis; aperturâ intus fuscâ, anticè tuberculatâ, plicâ validâ.*
Hab. — ?

This species resembles *P. veraguensis*; but the areas between the cancelli are simple, whereas in *P. veraguensis* there is an intermediate, elevated line, crossing them, a circumstance not mentioned in the description of Mr. Hinds.

12. PHOS TURRITUS, A. Adams. *P. testá ovato-fusiformi, tenui, subpellucidá, spirá turrítá, acuminatá, albido-fuscatá; anfractibus rotundatis, costis longitudinalibus angustis numerosis, lineis elevatis, transversis, ad costas nodulosis, ornatis; columellá plicá anticá subevanidá.*

Hab. Panama, coral sand, 6 to 10 fathoms; *H. C.*

13. PHOS TEXTILIS, A. Adams. *P. testá elongatè ovatá, albidá, spirá acutá, costis rotundatis, crassis, infra suturam nodoso-angulatis, lineis transversis, planis, subconfertis, elevatis, interstitiis longitudinaliter subtilissimè striatis; columellá plicá anticá validá.*

Hab. Dumaguete, Philippines; *H. C.*

In general form this species approximates *P. Blainvillii*, but the elaborate and distinct style of sculpture and white aperture at once distinguish it.

14. PHOS RUFOCINCTUS, A. Adams. *P. testá ovato-fusiformi; spirá productá, angustá, albidá, fasciá rufá ornatá; anfractibus rotundatis, costis crassis, infra suturam rotundatis, lineis transversis, elevatis, nodulosis, confertis, ornatis; columellá plicá anticá productá.*

Hab. Dumaguete; *H. C.*

The nucleus of this species is large and papillary.

15. PHOS SCALARIOIDES, A. Adams. *P. testá ovatá, acuminatá, turrítá, albidá, fusco variegatá, obscurè fusco bifasciatá; anfractibus rotundatis, costis longitudinalibus, distantibus, infra suturam rotundatis, lineis elevatis, transversis, ad suturas nodulosis, interstitiis subtilissimè longitudinaliter striatis; columellá supernè callosá, infernè plicá productá; labro intus lirato.*

Hab. — ?

A beautiful species, with regular, strong ribs, giving it the appearance of a *Scalaria*.

16. PHOS SPINICOSTATUS, A. Adams. *P. testá ovatá, spirá acuminatá, albidá, sparsim fusco nebulosá; anfractibus rotundatis, costatis, costis distinctis, subdistantibus, infra suturam angulatis et spinosis, lineis transversis elevatis ornatis; columellá rufo-fusco maculatá, plicá anticá productá; labro intus rufescenti lirato.*

Hab. Batangas, in insulis Philippinis.

17. PHOS NODICOSTATUS, A. Adams. *P. testá ovatá, turrítá, acuminatá, albidá, rufo-fusco maculatá; anfractibus rotundatis, costatis, costis distantibus, infra suturam angulatis et nodosis, lineis transversis, elevatis, ad costas nodulosis ornatis; columellá plicis evanidis, plicá anticá validá productá.*

Hab. ad insulam Negros; *H. C.*

The two species, described above, are somewhat similar in form,

but the peculiarity of the ribs and colour of the apertures readily distinguish them.

18. PHOS CYLLENOIDES, A. Adams. *P. testá oratá, albido-fusca, spirá acutá, longitudinaliter plicato-costatá, costis superne nodosis, ad suturam exanidis, lineis impressis transversis sulcatá; columellá plicá anticá, valdè productá; labro intus fusco lirate.*

Hab. in insulis Philippinis.

19. PHOS CYANOSTOMA, A. Adams. *P. testá elongatè oratá, acuminatá, albidá, anfractibus rotundatis, costatis, costis crassis, æqualibus, infra suturam plicato-nodosis, cingulis elevatis, transversis, subdistantibus, interstitiis longitudinaliter subtilissimè striatis; aperturá cyaneo tinctá; columellá tuberculatá, plicá anticá validá.*

Hab. in insulis Philippinis.

The interstices between the transverse ridges in this species are very beautifully engraved with fine longitudinal lines, and the aperture is tinged with blue.

20. PHOS LÆVIGATUS, A. Adams. *P. testá elongatè oratá, lævigatá, pallide fusca; anfractibus subrotundatis, costatis, costis crassis, distantibus, lævigatis, infra suturam valdè nodosis, lineis tenuibus transversis ornatis; columellá plicá anticá productá; labro extus plicato, plicis numerosis confertis, intus substriato.*

Hab. Promontorium Bonæ Spei.

A large, smooth shell, with thick, simple ribs.

June 25, 1850.

William Yarrell, Esq., Vice-President, in the Chair.

The following papers were read:—

1. CATALOGUE OF THE MAMMALIA OF CEYLON. COLLECTED AND OBSERVED BY E. F. KELAART, M.D., F.L.S.

Order PRIMATES.

Fam. SIMIADÆ.

1. *Presbytes cephalopterus*, Gray. The Nestor or Purple-faced Monkey.
2. *Presbytes Thersites*, Blyth. The Wanderoo of Ceylon.
3. *Presbytes Priamus*, Elliot. The larger Wanderoo.
4. *Simia sinicus*, Desm. The Rillouwah or Green Monkey.

There is another Monkey found in Newera Ellia and its neighbourhood, resembling the *P. Priamus*. The *Simia Silenus* is not a native of Ceylon; it comes from the Malabar coast.

Fam. LEMURIDÆ.

5. *Loris gracilis*, *Geoff.* The Loris or Ceylon Sloth.

The *Loris tardigradus* is said to be also found in the island, but I have not yet seen it.

Fam. VESPERTILIONIDÆ.

6. *Kerivoula picta*, *Gray.* Painted Kerivoula.
 7. *Pteropus Edwardsii*, *Geoff.* The Flying Fox.
 8. *Cynopterus marginatus*, *F. Cur.* The Cynoptere (margin-eared).
 9. *Vespertilio pipistrellus*, *Gm. var.* The Pipistrelle.

There are two other Bats in the island which Mr. Edgar Layard has seen and identified.

Order FERÆ.

Fam. FELIDÆ.

10. *Leopardus varius*, *Gray.* The Leopard (Cheetah of Ceylon).
 11. And var. black, *Felis Melas*, *Peron.*
 12. *Leopardus viverrinus*, *Gray.* Var. of the Wagati Cat. The Jungle Cat of Ceylon.
 13. *Felis Chaus*? The Lynx-like Cat.
 14. *Felis domestica*. The domestic Cat (several varieties).
 15. *Viverra indica*, *Geoff.* The Indian Genette.
 16. *Herpestes griseus*, *Sykes.* The Grisled-brown Mungous.
 17. *Herpestes vitticollis*, *Elliot.* The Streaked-neck Mungous.
 18. *Paradoxurus zeylanicus*. Two varieties of the Ceylon Paradoxure.
 19. *Canis aureus*, *Linn.* Two varieties of the Jackal.
 20. *Canis familiaris*, var. Pariah. The Pariah Dog.
 21. *Lutra nair*, *Sykes.* The Otter.

I have heard it stated that the Bengal Tiger (*Felis Tigris*) was seen some years ago in Newera Ellia and in the Jaffna district.

I have an imperfect skin of an animal killed at Newera Ellia resembling much that of a *Prionodon*.

Fam. URSIDÆ.

22. *Ursus labiatus*, *Blainv.* The Indian (lipped) Bear.

Fam. TALPIDÆ.

23. *Sorex murinus*, *Linn.* The Musk Shrew.
 24. *Corsira Newera Ellia*, *Nobis.* The Black Shrew.
 Corsira nigrescens, var. or new species.
 25, 26. *Erinaceus*, two species. The Hedgehog.

Order CETE.

- 27. *Halicore Dugong*, *F. Cuv.* The Dugong.
- 28. *Delphinus*, *Sp.* The Dolphin.

The Porpoise and the Whale are also sometimes seen on the coast of Ceylon.

Order GLIRES.

Fam. MURIDÆ.

- 29. *Mus bandicota*, *Gray.* The Bandicot or Pig Rat.
- 30. *Mus decumanus*, *Pallas.* The Norway Rat.
- 31. *Mus niviventer*, *Hodgs.?* The White-bellied Rat.
- 32. *Mus musculus*, *Linn.* var. The common Mouse, two varieties.
- 33. *Leggada booduga*. The Booduga (Soil Rat).
- 34. *Golunda newera*, *Nobis.* The Golunda (Soil Rat).

Fam. HYSTRICIDÆ.

- 35. *Hystrix leucurus*, *Sykes.* The Indian Porcupine.
- 36. *Cavia Cobaya*. The domesticated Guinea Pig.

Fam. LEPORIDÆ.

- 37. *Lepus macrotus?*, *Hodgson.* The Indian or Ceylon low country Hare.
- 38. *Lepus nigricollis*, *F. Cuv.* The highland Black-naped Hare.
- 39. *Lepus cuniculus*, *Linn.* The tame Rabbit.

Fam. JERBOIDÆ.

- 40. *Pteromys nitidus*, *Geoff.* The Flying Squirrel.
- 41. *Sciurus macrurus*, *Forster.* The Rokea, two varieties.
- 42. *Sciurus palmarum*, *Linn.* The Palm Squirrel.
- 43. *Sciurus trilineatus?* The Three-streaked Squirrel.

There are three other species of Squirrels in the island, and another flying Squirrel, the skin of which I possess without its head.

Order UNGULATA.

Fam. BOVIDÆ.

- 44. *Bos taurus*, var. *Indicus.* The Ox.
 - 45. *Bubalus Buffelus*, *Gray.* The Buffalo (wild and domesticated).
 - 46. *Ovis Aries*, var. The Jaffna Sheep.
 - 47. *Capra hircus*, var. The Ceylon Goat.
- The *Bos gaurus* was once seen on the island.
- 48. *Meminna indica*, *Gray.* The Meminna.
 - 49. *Muntjac vaginalis*, *Gray.* The Muntjac.
 - 50. *Axis maculata*, *Gray.* The Spotted Axis.
 - 51. *Cervus unicolor*, *H. Smith.* The Ceylon Rusa or Stag.
 - 52. *Cervus porcinus?*, *Auct.* The Hog Deer.

Fam. EQUIDÆ.

53. *Equus caballus*, *Linn.* The Horse. Introduced.
 54. *Equus asinus*, *Linn.* The Ass. Introduced.

Mules are also bred in the island.

Fam. EQUIDÆ.

55. *Elephas indicus*, *Linn.* The Asiatic Elephant.
 56. *Sus indicus*, *Gray.* The Indian Wild Boar.
 57. *Sus scrofa*, var. *sinensis*. The domesticated Hog.

Fam. DASYPIDÆ.

58. *Manis pentadactyla*, *Linn.* The Pangolin, or scaly Ant-eater.

REMARKS.—The new species indicated in the foregoing Catalogue may be described as follows:—

34. *GOLUNDA NEWERA*, *Nobis.*

Fur soft, yellowish brown varied with black; chin and beneath yellowish grey; under-fur dark lead-colour; soft long hairs on the upper parts of the head and body, with longer black-tipped hairs having a subterminal yellowish band; fur of belly dark lead-colour tipped with yellowish grey; ears large, hairy on both sides, of a light rusty or ashy colour; whiskers slender, moderately long, some greyish, others blackish; tail shorter than the body, tapering to a point, scaly; upper surface of a black colour and covered with short semi-adpressed black hair; lower surface yellow or ashy colour, covered with short hair of the same yellow colour; feet having dark brown claws, purplish; four toes to the fore-feet, with a clawless rudimentary thumb; five hind-toes, three middle subequal; soles nearly bald, blackish; palma studded with four small tubercles; planta with six tubercles, the two foremost considerably larger; incisors yellow, superior ones grooved in the centre; molars flat, deeply 3-lobed, tubercles rising in three distinct lines, middle larger than those of the sides, and the front one extending beyond the two other lobes.

Length of body and head, $3\frac{1}{4}$ inches; tail, $2\frac{1}{2}$.

This rat is found in the black soil of Newera Ellia, and is a great destroyer of peas and potatoes. The only two specimens I had, lived for some days in a cage and played like mice.

24. *CORSIRA NEWERA ELLIA*, *Nobis.* (Or variety of *Corsira nigrescens*.)

Slaty or ashy black, very slightly washed with rufous on the upper parts; no trace of rufous beneath, which is paler slaty; whiskers long, very thin, greyish; legs from half way down the thighs covered with short adpressed hairs; feet fleshy grey; hair on the toes longer, and those of the hind-feet extending over the claws; claws white, those of the front feet elongated, compressed, acute; toes 5-5, all clawed;

ears large, naked, partially hid in the fur ; tail black, round, tapering, rather scaly, and thinly covered with short hair intermixed with much longer, glossy, shining, thin, stiff hairs, some of which are also seen in the upper parts and sides of the lower half of the body ; teeth white throughout.

Length of body and head, $3\frac{1}{2}$ inches ; tail, $2\frac{1}{2}$.

Found in Newera Ellia and even on Pedrotellgala, the highest mountain in Ceylon, which rises from the plains of Newera Ellia, and is 8020 feet above the sea's level. I had one quite docile in a box for some days, which fed ravenously on earth-worms ; it used to run about the table and on my arms without attempting to get away ; it died one frosty night.

This shrew differs from the *Sorex murinus* chiefly in the absence of all unpleasant smell. I could not trace any glands or lacteæ in any part of the body. The elongated fore-claws is another good specific distinction. The *Sorex murinus* is also found here, and I am inclined to think that a very diminutive shrew, of which I have seen only one specimen, is another species, but which for the present I have considered as only the young of the above-described animal. It resembles in every point the *Sorex pygmaeus* of Hodgson (Mag. Nat. Hist. vol. xv.). There are several characters in our *Corsira* which make me consider it not identical with the *C. nigrescens* of Gray, especially the greater length of its tail than in the animal found on the continent of India, which I know only from Mr. Gray's description.

Of the Mammals enumerated in the catalogue, the following are found in Newera Ellia :—*Presbytes priamus*, var. ; *Vespertilio pipistrellus*, var. ; *Felis varius* ; *Felis chaus* ? ; *Herpestes ritticollis* ; *Viverra indica* ; *Paradoxurus* (two var. or species) ; *Canis aureus* ; *Mus Bandicota* ; *Mus musculus* (variety with white feet) ; *Mus albi-venter* ; *Golunda Newera* ; *Sorex murinus* ; *Corsira Newera Ellia* ; *Lepus nigricollis* ; *Sciurus macrurus* (very black-coloured variety) ; *S. trilineatus* ? *Elephas indicus* ; *Lutra nair* (perhaps another species, for I only saw it taking the water). The *L. nair* is found in abundance in the low country ; and a *Prionodon*, the skin resembling one I have.

Of Birds, the following I have here, besides those I have enumerated as new : *Cissa puella*, Blyth ; *Caprimulgus indicus*, Latham ; *Palæornis Layardii*, Blyth ; *Hirundo domicola* ; *Acanthytis caudacuta* ? ; *Collocalia nidifica* ? ; *Gracula ptilogenys* ; *Columba Elphinstonii*, var. ; *Parus cinereus* ; *Gallus Stanleyi* or *Lafayettei* ; *Galloperdix bicalcaratus* ; *Picus ceylonicus* ; *Dendrophila frontalis* ; *Hypsipetes nilgherriensis* ; *Hemipus picatus* ; *Corydala rufa* ; and a few others.

Newera Ellia, Ceylon, 8th May, 1850.

2. ON THE BLOOD-COLOURED EXUDATION FROM THE SKIN OF THE HIPPOPOTAMUS. BY JOHN TOMES, F.R.S., SURGEON-DENTIST TO THE MIDDLESEX HOSPITAL.

(Mammalia, Pl. XXI.)

The Honourable C. A. Murray, in a letter which he addressed from his residence at Cairo to Mr. Mitchell, states that the skin of the young Hippopotamus entrusted to his care was at times covered with a blood-coloured exudation, and that it was most abundant immediately after the animal had left his bath. At first this peculiar condition excited considerable alarm, but its constant recurrence, and the otherwise perfectly healthy appearance of the animal, induced the belief that the secretion was normal, or at all events portended no harm. In a letter received at a later date than the one I have referred to, Mr. Murray says that the exudation, though still preserving the same peculiar characters, has diminished both in amount and in intensity of colour.

On the day after the Hippopotamus arrived in the Zoological Gardens, I had a favourable opportunity of examining the general appearance of the skin. The upper surface of the body is dotted over with a number of deep brown spots, disposed on a comparatively faint brownish black ground. The spots are much more apparent when the skin is wet, than when it has become dry from exposure to the air. Immediately after leaving the bath, each of the deep brown spots may be seen to have a slightly raised centre, from which is poured a drop of pink fluid of the consistence of white of egg. This peculiar exudation speedily diffuses itself over the surface of the skin, and dries with a slightly glazed surface.

The Arab keeper who attended the Hippopotamus in his passage to this country, and who still has charge of him, says that he has never seen the red fluid exude, excepting immediately after the animal has left his bath; that it quickly dries up, and does not reappear till the animal again emerges from his bath. The end of the nose is however constantly a little damp, from the presence of a small quantity of a colourless mucous fluid, which escapes from minute pores situated in this part. At the line of junction with the skin and the smooth semi-mucous membrane which covers the extremity of the nose, the fluid has a faint pink colour.

On the second day of the animal's residence in the Gardens, I collected a small portion of the coloured fluid from the middle part of the back, and after securing it between two slips of glass, placed it in the field of my microscope, which I had conveyed there for the purpose of making an examination previous to the fluid undergoing any change, either from decomposition or evaporation, which a slight lapse of time might possibly have affected.

The following particulars were obtained from the examination I then made:—The exudation is composed of a transparent fluid in which float two kinds of corpuscles; one kind is tolerably abundant, and is both transparent and colourless; the other is comparatively rare and of a bright red colour. To the solution of these latter bodies the fluid owes its peculiar colour.



100x. 100x. 100x.

Part 2. 100x. 100x. 100x.

Exudation from the skin of the
HIPPOPOTAMUS
A Colourless Globules B Coloured Globules

The colourless corpuscles are spherical in shape, and vary in diameter from the 3450th to the 2100th of an inch; the majority however measure about the 3000th of an inch. Their structure is granular, and in about the same degree as the colourless corpuscles of blood, and the ordinary exudation corpuscles, to which they present a strong resemblance.

Many of these bodies preserve their figure for a considerable time, while others become collected into clusters and form irregular broken masses.

The coloured corpuscles are irregular in size and shape, and are composed of an aggregation of minute elongated and sometimes triradiate bodies, many of which appear, from their irregular and obscure outline, as though partially dissolved. In the immediate neighbourhood of these, the fluid has a much deeper colour than elsewhere. From these circumstances I have been led to conclude that the general pink colour of the fluid is due to the solution of the coloured particles, and not simply to their presence. In this particular the fluid under consideration is strikingly different from blood, which owes its colour to the presence of coloured globules and not to their solution.

The colourless corpuscles are represented in the figure at A, and the coloured ones at B, together with the deeper colour of the fluid at the part in which the latter are present.

These observations were made May 28th, 1850. Since that time I have on several occasions sought to obtain a little more of the red exudation, but always without success. The creature on leaving the bath feels slimy, and a small quantity of transparent tenacious fluid issues from the elevations on the skin, but it quickly dries up.

On Sunday last, June 23, the nose was covered with colourless exudation, and near the upper margin of the nostril it had a perceptible pink tinge. On this occasion the animal had been out of the bath for some hours, and the skin of the body was perfectly dry.

Whether the red colour of the exudation is a condition of youth, and of an imperfect condition of the skin, and has ceased in consequence of the increased age of the animal and the consequent more perfect development of the integument, or has ceased in consequence of the change of climate to which the animal has been lately subjected, is a question which, with the facts at present at our disposal, cannot be satisfactorily determined.

We have however sufficient evidence to warrant the conclusion, that the thick tenacious exudation, whether coloured or otherwise, is poured out only during the time the skin is immersed in water, and that it has an especial reference to the aquatic habits of the animal. It appears for the time to convert the surface of the body into a mucous membrane, and then, on the animal leaving the water, to furnish by its inspissation an epidermis.

Should further inquiry show that the thickness of the exudation arises from a solution of the colourless globules, its relation to mucus will be still further established, and a microscopic examination into

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the structure of the skin will become a subject of great physiological interest.

3. ON SIX NEW SPECIES OF HUMMING BIRDS.

By JOHN GOULD, F.R.S. ETC.

Although the Trochilidae have lately received much attention both from our own and the continental naturalists, the subject is far from exhausted, as is shown by the circumstance of my being able to bring before the notice of the Society this evening no less than six species hitherto uncharacterized and unknown. These great accessions to the family are all from a state with which we have as yet had but little intercourse—that of Veragua in Central America; and we are indebted for a knowledge of them to the researches of an enterprising traveller and botanist, M. Warzewicz, who has just returned from that country, where he successfully explored many forests and other districts not previously trodden by the foot of civilized man. Unfortunately, both for myself and for science, he was not able, in consequence of the heavy rains which prevailed at the time, to procure or to preserve the examples in so fine a state as could be wished; although much mutilated and otherwise damaged, they are, however, sufficiently perfect to admit of my furnishing the following descriptions:—

1. TROCHILUS (SELOSPHORUS) SCINTILLA.

Male: upper surface bronzy green; on the throat a gorget of glittering fiery red, the feathers of which are much produced on either side; beneath the gorget a band of buffy white; wings purple-brown; central tail-feathers brownish black, margined with rusty red; lateral tail-feathers brownish black on their outer and rusty red on their inner webs; under surface reddish brown; bill black.

Female: upper surface as in the male, but not so bright; under surface white; throat-feathers less produced, and spotted with brown on a white ground; flanks buff; tail rufous, crossed by a crescentic bar of black near the tip.

Total length of the male, $2\frac{3}{4}$ inches; bill, $\frac{1}{2}$; wing, $1\frac{1}{4}$; tail, 1.

Hab. Volcano of Chiriqui, at an altitude of 9000 feet.

This is an extremely beautiful species, and forms a miniature representative of the *Trochilus rufus*, to which it is somewhat allied.

2. TROCHILUS (THAUMATIAS ?) CHIONURA.

Male: upper surface very dark grass-green; wings purplish brown; central tail-feathers bronzy green; lateral tail-feathers white, largely tipped with black; throat pale shining green; flanks greenish; centre of the abdomen and under tail-coverts white; upper mandible black, base of the lower mandible fleshy white.

Female: upper surface as in the male, but paler; lateral tail-feathers white, as in the male, but crossed near the extremity with an oblique band, instead of being tipped with black; throat and under surface generally white.

Total length, $3\frac{1}{2}$ inches; bill, $\frac{5}{8}$; wing, $2\frac{1}{4}$; tail, $1\frac{1}{4}$.

Hab. Chiriqui near David, province of Veragua, at an altitude of from 2000 to 3000 feet.

This is a remarkable species, differing, as it does, from all other Humming-Birds with which I am acquainted, in the large amount of white on the tail-feathers, which shows very conspicuously when that organ is spread. In form it is very similar to the *T. brevirostris* and *T. longirostris* of the Brazils.

3. TROCHILUS (THALURANIA) VENUSTA.

The entire crown, back of the neck, and upper part of the back, shoulders, abdomen, and under tail-coverts, beautiful shining ultramarine blue; throat and fore-part of the neck rich metallic green; wings purplish black; tail considerably forked, and of a blackish blue; bill black.

Total length, 4 inches; bill, $\frac{1}{4}$; wing, $2\frac{1}{8}$; tail, $1\frac{3}{4}$.

Hab. Volcano of Chiriqui in Veragua.

Remark.—Nearly allied to, and of the same form and size as, the *T. furcatus*, but a far finer bird.

4. TROCHILUS (—?) CÆRULEOGULARIS.

Male: upper surface, shoulders, abdomen and under tail-coverts, shining grass-green; throat, sides of the neck and chest, rich violet-blue; wings purple-brown; tail rather forked; central feathers bronzy green; lateral feathers purplish black; upper mandible and tip of the lower black; basal portion of the latter fleshy white.

Female: upper surface shining grass-green, but of a paler hue than in the male; tail as in the opposite sex, except that the lateral feathers are tipped with white; centre of the throat, abdomen and under tail-coverts white.

Total length, $3\frac{1}{2}$ inches; bill, $\frac{3}{8}$; wing, 2; tail, $1\frac{1}{2}$.

Hab. Near David, on the north side of the Cordillera, Veragua.

I am also indebted to Dr. T. B. Wilson of Philadelphia for the loan of a specimen from Panama. This species is precisely of the same elegant form as the *T. Goudotii*, but is of a larger size, and is at once distinguished from that bird by its blue breast.

5. TROCHILUS (—?) CASTANEOVENTRIS.

Crown of the head metallic green; upper surface green; wings purplish brown; tail dark bronzy green, crossed near the tip by a broad band of black; the lateral feathers tipped with buff, which decreases in extent as the feathers approach the central ones; all the under surface reddish chestnut; bill black.

Total length, 4 inches; bill, $\frac{1}{4}$; wing, $2\frac{1}{4}$; tail, $1\frac{3}{8}$.

Hab. Cordillera of Chiriqui, at an altitude of 6000 feet.

Remark.—This is a moderately sized species, and is not allied to any other member of the family with which I am acquainted; I am therefore unable to assign it a place in any of the sections hitherto proposed; the specimens I possess appear to be immature, and are unfortunately in bad condition.

6. *TROCHILUS* (— ?) *NIVEOVENTER*.

Crown of the head and back of the neck bronzy green; back rich coppery bronze; wings purple-brown; upper tail-coverts reddish purple; tail purple-black; throat resplendent green; abdomen snow-white; flanks green; under tail-coverts greenish brown, margined with white; bill black, except the basal three-fourths of the lower mandible, which are flesh colour.

Total length, $3\frac{3}{4}$ inches; bill, $\frac{1}{4}$; wing, $2\frac{1}{8}$; tail, $1\frac{1}{4}$.

Hab. Near David; warm countries of Veragua.

Remark.—Nearly allied to *T. Edwardi* and *T. erythronotus*; from the former, however, it differs in the colour of the tail, and from the latter in the white colouring of the breast.

July 9, 1851.

John Gould, Esq., F.R.S., in the Chair.

The following papers were read:—

1. ON THE GENERIC SUBDIVISION OF THE BOVIDÆ, OR HOLLOW-HORNED RUMINANTS. BY H. N. TURNER, JUN.

In the series of observations upon the Ungulate Mammalia, of which I attempted last winter to lay before the Society the more general results, my attention was also in some measure directed towards the detailed arrangement of those portions of the order which have generally proved subjects of difficulty. Of these, the classification of the *Bovidæ*, or hollow-horned Ruminants, has certainly been the greatest, since they form a well-marked natural group, including a great variety of forms, with but few remarkable differences of structure. I soon found, however, that even setting aside some of the more strikingly-modified genera, the distinctions afforded by the skull were much more decided than any that I could find among the *Cervidæ*, which, from their being less rich in number and variety, were always easier to subdivide correctly. Not having been able at that time to observe the skulls of certain of the more remarkable forms, I set the matter aside for better opportunities; and now that the large and interesting collection of hunters' spoils which Mr. Roualeyn Gordon Cumming has brought together, and is at present exhibiting in London, has given me the opportunity of supplying some of these desiderata, I venture, although there are yet a few points I could wish to ascertain, to lay this portion of my researches before the Society.

There cannot be a doubt that the horns present the best and most readily discernible characters, or that, when the genera are once correctly determined, they may be pretty easily defined by the variations of these parts alone; but it has long since been seen how the con-

sideration only of the horns has led to very unnatural approximations. For example, Cuvier associates the Addax with the Indian Antelope; and Mr. Blyth, his translator, inserts his belief that it is more allied to the Coudou, which I think modern naturalists will allow to be equally wide of the truth. Again, the species forming the genera *Ægocerus* and *Nemorhædus* of Major Smith are placed together in the 'Règne Animal,' and Mr. Blyth hints that the Ahoa may be allied to the Oryx.

It is certainly remarkable, that while the teeth have contributed so important a share in the characters by which the mammalia have been arranged by various authors, they should have been so entirely overlooked in the members of the present division; for notwithstanding the great uniformity and strongly-marked character pervading the Ruminant dentition, very decided characters may frequently be found in the form and direction of the incisors, and in the presence or absence of the supplemental lobe in the molars; and it is the more to be wondered at when we consider that the incisors, from their position, may often easily be seen in dried specimens, and that the character alluded to in the molars has been found of considerable value in the interpretation of fossil remains. The remaining characters I shall have to bring forward consist of certain little details of structure in the skull, which are very easy to be perceived, and which, as I have found them constant in those groups which I have characterized by their means, I trust may meet with due consideration from naturalists.

Of late years, while some zoologists have remained content to call all hollow-horned Ruminants that are neither oxen, sheep, nor goats, by the generic name *Antelope*, another class have run into the extreme of the modern fashion by using every trifling external difference visible in dried skins, or recorded in books (sometimes not even excepting size and colour), to divide them so extensively, that the characters of the genera become more difficult to remember than those of the species. Considering the difficulty of observing many of these characters in dry specimens, and of bearing such trivial details in the memory, it is not to be wondered at that many errors of observation have crept in, a few of which I will point out as I proceed, limiting myself in my own diagnoses to the characters of the skull and horns. There is no doubt that the suborbital sinus, improperly called "lacrimal sinus" (translated into "tear-pit" by some authors, "tear-bag" by Mr. Gray), will form a valuable means of distinction when its structure in all the genera has been sufficiently observed upon fresh individuals, or on the parts preserved in fluid, provided that we do not attach too much importance to its relative dimensions; but although its dried appearance may assist discrimination, we cannot venture to describe it. As to inguinal pores and interdigital pits, it must always be difficult, and frequently impossible to determine their presence or absence in specimens that are dried and mounted. Tufts upon the joints of the limbs, and the extent of bare space upon the muzzle, are certainly much too trivial to warrant generic distinction, and never mark out any particular natural group.

The last attempt to arrange this extensive family in subordinate groups is that of Mr. Gray, published in the eighteenth volume of the 'Annals and Magazine of Natural History.' His preliminary remarks, though brief, appear to me quite sufficient to dispose of the arrangements previously set forth, therefore I will content myself with the consideration of his own. The two primary divisions, which are founded only upon the horns, certainly do not indicate any very natural affinities, since, taking the whole structure into consideration, the *Antilopeæ* of Mr. Gray are not more closely allied to the *Bovææ* than they are to the members of the second primary division, nor do the *Strepsicerææ* ally themselves particularly to the Sheep and Goats. With regard to the subdivision of the *Antilopeæ*, he is certainly right in separating the "Antelopes of the Desert" as a group, although there is no doubt that some of the divisions of the "Antelopes of the Fields" are equally as distinct from each other as they are from the former. The division of the latter group into "True Antelopes," "Caprine Antelopes," and "Cervine Antelopes," also possesses some merit; but the genera *Capricornis* and *Nemorhædus* are very distinct from the other Caprine Antelopes, and the genus *Eleotragus* (*Redunca* of Major Smith) is very distinct from the other true Antelopes, and ought, as I am quite convinced, to include the genus *Kolus* of Dr. Andrew Smith, placed by Mr. Gray among his Cervine Antelopes, and consisting of species not known at the time Major Smith was engaged in these researches.

It will be universally admitted, that for the generic division of the Ruminants, zoology is most indebted to Major Smith, and in the course of my observations I have found reason to reject but few of the divisions proposed by him as subgenera, and few, if any, in my opinion, need be added. As I thus propose to curtail the list of genera adopted by Mr. Gray, and to separate certain of them from those with which he has associated them, several will stand alone; and of those which do ally themselves together, no group seems to manifest that particular relationship with other groups which should warrant us in separating the family, as Mr. Gray has done, into divisions of a primary, secondary, tertiary, and in some cases even a fourth and fifth degree of rank.

I will, therefore, while enumerating the characters which I have observed in the genera I propose to adopt, point out which of them appear to constitute groups, and mention those species which, from the inspection of entire specimens, skulls, or at least horns, I feel warranted in referring to the genera under which I place them. As I have seen nothing to guide me to a particular linear arrangement, any naturalist who may be pleased to adopt my divisions is at liberty to place the groups, and the genera contained in each, in whatever order he may think most convenient.

I will first proceed to the "true Antelopes" of Mr. Gray, excluding the genus *Eleotragus*. They all have the horns round, the middle incisors expanded at their summits, the others being bent outwards to make room for them, and the molars without supplemental lobes. The infraorbital depression when existing upon the skull is gene-

rally suddenly pressed in before the orbit. The genera are as follows :—

ANTILOPE.

No suborbital fissure nor fossa*, but a wide opening on the side of the muzzle, between the maxillary and intermaxillary bones; the masseteric ridge rising before the orbit; the auditory bulla large and prominent, with only a small groove on its outer side to receive the attachment of the stylohyal bone; the occiput broad, somewhat produced downwards; its basal portion with the posterior pair of tubercles broad, the anterior ones small. Molars without the supplemental lobe.

Horns annulated, curving outward from the base, then bending backwards and towards the tip upwards.

Hab. South Africa.

A. Melampus.—Of this single species, to which modern zoologists have confined the old generic name, I have only seen skulls of the male, in Mr. Cumming's collection: the lower jaw, as in most of his skulls of Ruminants, being wanting in all of them, I could not ascertain the character of the incisive teeth.

Major Smith assigns a suborbital sinus to this genus, making the principal distinction from the next to consist in the absence of horns in the female, thus associating with it the *gutturosa* and *colus*, belonging properly to the next genus,—the *cervicapra*, which it seems most convenient to separate,—and the *adenota*, which I must now refer to the genus *Eleotragus*. With his *A. forfex* I am at present unacquainted. *Melampus* alone remains, to which Mr. Gray rightly assigns no "tear-bag;" this, together with the horns, must be the external character of the genus, if, indeed, it be essentially distinct from the Gazelles, for the horns might be considered as a distorted modification of the lyrate type, and some species of that genus seem to want the suborbital sinus.

GAZELLA.

A suborbital fissure, and a moderate, or very slight fossa, suddenly pressed in before the orbit; the masseteric ridge rising before the orbit; the auditory bulla large and prominent; the basioccipital bone having its tubercles moderately or but little developed; the median incisors expanded at their summits; the molars without supplemental lobes.

Horns annulated, more or less resembling an inverted lyre; that is, bending a little outwards soon after their origin, and again inwards towards the tip.

Hab. Eastern Europe, Asia and Africa.

* I here use these terms with reference only to the skull, the fissure being that opening existing in most Ruminants, filled up during life by membrane, between the nasal, frontal, lacrymal and maxillary bones; and the fossa, the depression upon the surface of the lacrymal bone immediately before the orbit, generally affording some indication as to the existence and structure of the suborbital sinus.

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| <i>G. dorcas.</i> | } Of these species I have seen skulls. | <i>G. subgutturosa.</i> |
| <i>G. Bennettii.</i> | | <i>G. Scemmeringii.</i> |
| <i>G. euchore.</i> | | <i>G. mhorr.</i> |
| <i>G. gutturosa.</i> | | <i>G. colus.</i> |
| | | <i>G. kemas.</i> |

Several of the so-called species that are closely allied in size and colour to *G. Dorcas*, appear to me to be merely varieties, as some of them have been considered by the older naturalists.

This genus seems prone to exhibit in certain species inhabiting more temperate regions, enlargements of, or appendages to, the respiratory passages; for example, the enlarged larynx of *G. gutturosa*, the elevated nose of *G. colus*, and the appendages to its sides in the Chiru (*G. kemas*); these seem to be physiological adaptations, in no case marking a group, and therefore insufficient to warrant generic distinction, which has been made in the two latter instances. However, not having as yet seen entire skulls of these species, I retain them provisionally in this genus, judging by the horns. I think few naturalists will set forth, with Mr. Gray, the colour of the horns of the Saiga as a generic character. Even in the *G. Bennettii*, so closely allied to *G. dorcas*, Mr. Hodgson states that the suborbital sinus is wanting, and he places the animal in a distinct genus, *Tragops* (afterwards altered to *Tragomma*), on account of this difference; while Colonel Sykes, the original describer of the species, affirms that it exists, though of very small size. Mr. Hodgson also denies it to the Chiru, which forms his genus *Panthelops*, and to which he assigns only five molars in each series.

CERVICAPRA.

A small suborbital fissure, and a very large fossa; the tubercles and median groove of the basioccipital bone well-developed. The other cranial characters as in *Gazella*.

Horns annulated, spirally twisted.

Hab. India.

C. bezoartica.

The remainder of this group, if we exclude the *Cephalophi* and the four-horned Antelopes of India, consists of a number of small species, apparently nearly allied, forming the subgenera *Tragulus* and *Neotragus* of Major Hamilton Smith. These are very distinguishable by the former having vertical, the latter recumbent horns; to the former, however, must be added the *Ourebi* (*A. scoparia*), from his subgenus *Redunca* (*Eleotragus*). Mr. Gray divides them into several genera, depending upon the presence or absence of inguinal pores and knee-tufts, the shape of the hoofs, the presence or absence and form of the "tear-bag," the condition of the fur; and one genus, founded upon two very young specimens, is characterized by the absence of the lateral rudimental hoofs. Most of these characters I must decidedly reject; and as I do not consider the evidence of dried skins quite satisfactory with regard to certain others, and have as yet

seen skulls of only two species, I will content myself at present with adopting only the two genera of Major Smith; using however, for the first one, Mr. Gray's generic name *Oreotragus*, without at present wishing to enter into the question of its right to supersede that of *Tragulus*, because the latter name has been also used by Mr. Gray for a group of small Musk Deer, needlessly separated from the Meminna.

I do not see sufficient in the small horns contained in the Museum of the College of Surgeons to warrant the adoption, as a genus, of Major Smith's subgenus *Raphicerus*. I will not attempt to conjecture to what species they may belong: they show nothing to prevent their ranking among the *Oreotragi*; and their locality, said to be the East Indies, while all the members of this genus are African, is not known with certainty.

OREOTRAGUS.

A small suborbital fissure, with a large deep fossa suddenly pressed in before the orbit; the masseteric ridge rising a little before the orbit; the auditory bulla rather large and prominent; the basioccipital bone flat and smooth; the median incisors expanded at their summits, and the molars without supplemental lobes.

Horns small, placed forwards, vertical.

Hab. Africa.

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| <i>O. saltatrix.</i> | } Of these two species I |
| <i>O. scoparius.</i> | |
| <i>O. tragulus.</i> | |
| <i>O. melanotis.</i> | |
| | have seen skulls. |

NEOTRAGUS.

Horns recumbent.

Hab. Africa.

N. saltianus.—Of this animal I have seen no skull, but adopt for the present Major Smith's division, as the different direction of the horns is well-marked. It has the suborbital sinus, however, although its absence is assigned as a character by Major Smith. Of the other species included in the subgenus, I have seen but the two young specimens upon which Mr. Gray has founded his genus *Nanotragus*; they having no horns, I will not here venture to point out their location. The lateral rudimental hoofs are also wanting in at least one species of the last genus, the *Oreotragus Tragulus*, which Mr. Gray places in his genus *Calotragus*.

The skulls of the species of the two following genera are distinguished from those of the preceding ones by their having no suborbital fissure, and the fossa being large and not so suddenly pressed in in front of the orbit; and by the horns (or at least, in one case, the principal pair) being thrown back quite to the posterior edge of the frontal bone.

CEPHALOPHUS.

No suborbital fissure, a large fossa occupying the whole side of the

cheek ; the nasal bones expanded behind, reaching over a little way into the fossa. The other cranial characters as in *Oreotragus*.

Horns placed far back, inclined backwards.

Hab. Africa.

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| <i>C. mergens.</i> | <i>C. Maxwellii.</i> |
| <i>C. coronatus.</i> | <i>C. monticola.</i> |
| <i>C. silvicultrix.</i> | <i>C. punctulatus.</i> |
| <i>C. Ogilbii.</i> | <i>C. grimmia.</i> |
| <i>C. Natalensis.</i> | <i>C. Whitfieldii.</i> |
| <i>C. rufilatus.</i> | |

I have taken this list of species from Mr. Gray's paper on the genus, published in the same volume of the 'Annals and Magazine of Natural History,' omitting a few that seem to me likely to prove varieties, and adding two, which I find named in the Museum, and not included in his paper. I have only seen skulls of two or three species, but no one will dispute the limits of this very distinct genus.

TETRACERUS.

The nasal bones not expanded ; the other cranial characters the same as in *Cephalophus*, with the addition of a second pair of horns of small size, placed over the orbits.

Hab. India.

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| <i>T. quadricornis.</i> | <i>T. subquadricornis.</i> |
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ELEOTRAGUS.

Nasal opening rather lengthened, the nasal processes of the intermaxillary bones long, yet not always reaching the nasal bones ; a large infraorbital fissure, but no fossa ; the masseteric ridge ascending rather high ; the auditory bulla large and swollen ; the basioccipital bone with its median groove and tubercles well-developed ; the median incisors expanded at their summits ; a well-developed supplemental lobe in the first true molar of each jaw, and usually more or less appearance of it in those behind.

Horns inclining backwards and outwards, transversely wrinkled, gently curving upwards, and a little inwards towards the tip.

Hab. Africa.

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| <i>E. reduncus.</i> | <i>E. adenota.</i> |
| <i>E. isabellinus.</i> | <i>E. sing-sing.</i> |
| <i>E. capreolus.</i> | <i>E. ellipsiprymnus.</i> |
| <i>E. arundinaceus.</i> | <i>E. leché.</i> |

I have seen skulls of the four preceding the last-named.

It is quite evident, both from the structure of the skull and horns, and from the general external appearance and markings, that the *Antelope adenota* of Major Smith, and certain large species forming Dr. Andrew Smith's genus *Kolus*, belong truly to this form, and that in the latter case, at least, naturalists must have been deceived by mere dimensions. The similarity of character between the horns of the *Adenota* and those of the other species is very recognizable, al-

though Major Smith, judging by these parts alone, supposed them to belong to the lyrate type. The species does not appear among those mentioned in Mr. Gray's paper in the 'Annals and Magazine of Natural History,' but from the name and place assigned to the specimen in the British Museum, he appears to have evaded the difficulty by constituting it a genus of itself, which is placed near the genus *Kolus*, the genus *Eleotragus* (as in his paper) being far removed. The skull in the Museum, although the occiput is lost, bears full evidence of its real affinity. Among the interesting additions to South African zoology discovered by those travellers who have visited the great lake recently discovered in that region, an undescribed species of Antelope*, of which a beautiful skin was recently brought before the Society, will perhaps assist the more sceptical in osteological characters in arriving at a just conclusion on this point, since, while it has the stature and lengthened horns of the *ellipsiprymnus*, it has the brilliant colour and the external marks (particularly the dark stripe down the fore-leg) which characterise the smaller species.

This genus does not seem to show any particular affinity for any of the rest, and forms a well-marked group, of which the species are scattered over various parts of Africa, and are mostly noted for their predilection for the vicinity of water.

I here again adopt Mr. Gray's generic name, to avoid the necessity of altering the name of one of the species, the *E. reduncus*.

STREPSICEROS.

The nasal opening of moderate size; a suborbital fissure, but no fossa; the masseteric ridge not extending high; the auditory bulla swollen and prominent; the basioccipital bone with its anterior and posterior pairs of tubercles well-developed, the former separated by a deep median groove; the median incisors expanded at their summits; the molars without supplemental lobes.

Horns inclined backwards from the base, twisted, with one or more longitudinal angular ridges.

Hab. Africa.

S. eudu.

S. euryceros.

S. Angasii.

S. oreas.

S. Derbianus.

S. scriptus.

S. silvaticus.

S. decula.

The general aspect of the skull in this group reminds one a little of that of the Deer. The species all agree very closely, both in structure of the skull, and in the direction, twisting, and ridges of the horns, the Coudou differing only in having the spiral wide and open, and in the horns being confined to the male, while the Eland is only a gigantic representation of the smaller species. *S. euryceros*, *S. Angasii*, and a species most probably distinct from the rest, of which Capt. Allen brought a skull from the Bight of Biafra, show an intermediate condition of the horns; and in *S. Angasii*, at least, they are known to be wanting in the female. Major Smith himself has here

* Since named *Kolus leché* by Mr. Gray.

been deceived by size, and been led to place the subgenus *Tragelaphus* under his genus *Antelope*, and the others under his genus *Damalis*; even availing himself of stature, and in the case of the Cou-dou, of a white streak over the eyes, to help out the meagre distinctions. In associating the Nyl-Ghau with these animals, Mr. Gray has even allowed colour and marking to deceive him, for in this animal the horns are not even spiral; but in another respect the characters assigned to his *Strepsicercæ* agree with the Nyl-Ghau, and *not* with the others, which certainly have no suborbital sinus, nor have any of them an ovine muzzle, by which Mr. Gray distinguishes the larger genera from the *Tragelaphus*. In these latter points Major Smith is correct.

I will now proceed to the "Antelopes of the Desert" of Mr. Gray, a very well-marked, natural group, consisting of two distinct genera, which have usually been widely separated. Mr. Blyth, however, in the translation of Cuvier's 'Animal Kingdom,' hints at their affinity, and Mr. Waterhouse informs me that he has long held that opinion. Indeed he has placed the species next each other in the Catalogue of the Society's Museum.

ALCELAPHUS.

A large deep impression before the orbit, but no fissure; the maseteric ridge not extending high; the bones of the face lengthened downwards and forwards, and the occiput also prolonged and drawn downwards; the auditory bulla large and prominent, enclosing a large rounded space for the attachment of the stylohyal bone; the basioccipital tubercles high and sharp, the groove between them narrow in front, wide behind, with a flat space between the occipital condyles; the median incisors expanded at their summits; the molars rather small, narrow, and without supplemental lobes, showing, when somewhat worn, a pit in the middle.

Horns placed high, ringed at the base, with double flexures more or less marked.

Hab. Africa.

A. bubalis.

A. lunatus.

A. senegalensis.

A. pygargus.

A. caama.

I have seen skulls of the three last-named.

Mr. Gray calls a portion of this genus "Boselaphus," doubtless intending *Alcelaphus* of De Blainville, which being antecedent to Major Smith's name *Acronotus*, should certainly be adopted. The genus is a very natural one, and the characters by which Mr. Gray proposes to divide it into two, are by no means sufficient. The last-mentioned species, *A. pygargus*, has usually been placed among the Gazelles, where it was left by Major Smith and by Mr. Blyth, who speaks of it as leading "through *A. Cuama*, *Bubalis*, &c. to the Gnus." Mr. Waterhouse, who in the Catalogue of the Society's Museum uses the generic name *Antelope* throughout, places this species

between the Gazelles and the others of its natural genus, to which the Gnu follows. Mr. Gray, who had left it with the Gazelles in the 'List of Mammalia' in the British Museum, has removed it to its true place in his paper in the 'Annals and Magazine.'

CATOBLEPAS.

The general characters of the skull the same as in *Alcelaphus*; but the depression before the orbit less marked; the occiput rather less prolonged, and its base, together with the auditory bulla, broader.

Horns broad at the base, inclining more or less downwards and outwards, and then bent upwards.

Hab. Africa.

C. gnu.

C. taurina.

The next genus is included by Mr. Gray among his "Caprine Antelopes," but differs from them in having a suborbital sinus or gland, of large size in some species, and of peculiar structure, opening externally by a single pore. Their nasal bones resemble those of the domestic Sheep, and their structure being altogether rather heavy, they might be called *Ovine Antelopes*.

NEMORHÆDUS.

No suborbital fissure; the fossa rounded, shallow, very variable in size, sometimes very minute; the nasal bones rather short and broad, joining the maxillaries only by the interposition of some imperfect ossification or separated from them altogether; the masseteric ridge extending high before the orbit; the auditory bulla very small; the basioccipital bone broad, with moderately developed eminences; the middle incisors slightly expanded at their summits; the molars without supplemental lobes.

Horns rising behind the orbits, annulated and wrinkled at the base, inclined and curved backwards.

Hab. India and its islands.

C. bubalina.

C. Sumatrensis.

C. goral.

This genus is too well-marked by nature to admit of subdivision. Although the "tear-bag" is said to be wanting in the *Goral*, there is certainly a slight depression upon the lacrymal bone, and the pore with which the gland opens may be so small in this species as to escape detection in dried specimens; but if it be really absent, the instances of the genera *Gazella* and *Ovis* must warn us against founding a genus solely on the want of this organ, while on the other hand, a difference in its structure seems to be of great zoological importance.

Since the foregoing observations were written, I have perused Mr. B. H. Hodgson's interesting account of the *Budorcas taxicolor*, in the 'Journal of the Asiatic Society of Bengal,' and a glance at the representations of the skull indicates very plainly that it is closely allied to *Nemorhædus*, to which Mr. Hodgson admits certain resemblances, and that it has no relationship with the Gnu, or the Musk Ox. The characters that I assigned to *Nemorhædus* would appear

to serve as well for this new and singular genus, except that there seems to be no suborbital depression, and the masseteric ridge, as may be expected from the general elevation of the skull, does not rise before the orbit. The horns, whose peculiar twist must constitute the diagnosis of the genus *BUDORCAS*, appear, from the rough figures given, to have the wrinkling at the base very similar to that in *Nemorhædus*.

The following genera may be considered as in some degree allied, and deserve the name of Caprine Antelopes. They have no sub-orbital sinus, but have a fissure in the skull, and their incisors are not widened at the summits.

RUPICAPRA.

A minute suborbital fissure, but no fossa; the masseteric ridge ascending high before the orbit; the auditory bulla very small and compressed; the basioccipital bone flat; the incisors equal-sized, vertical; the molars without supplemental lobes.

Horns slender, round, vertical, and hooked backwards at the tip.

Hab. Europe.

R. tragus.

DICRANOCERUS.

No suborbital depression; the fissure lengthened; the nasal bones widest posteriorly; the orbit a little elevated above the line of the face, and the masseteric ridge not rising before it; the auditory bulla moderate, compressed and angular; the incisors equal-sized, sloping; the molars without supplemental lobes.

Horns vertical, compressed, with a process on their anterior side, and hooked backwards at the tip.

Hab. North America.

D. Americanus.

APLOCERUS.

Horns round, vertical, gently curved backwards.

Hab. North America.

A. Americanus.

I have seen no skull of this animal, but leave it for the present in this location.

I must forego all notice of the *Ixalus probaton* of Mr. Ogilby, as there is no skull to be seen, and the horns in the only specimen known are quite in a rudimentary condition.

The genera next to be considered are the "Cervine Antelopes" of Mr. Gray, exclusive of the genus *Kolus*, which I have rejected. With the exception of the Nyl-Ghau and some of the *Eleotragi*, they are the only members of the old genus *Antilope* that have well-developed supplemental lobes in all the true molars; they have always been placed near together.

ÆGOCERUS.

A small suborbital fissure, but no fossa; the masseteric ridge ascending high before the orbit; the auditory bulla moderate; the occipital portion of the skull much prolonged; the basioccipital portion widened, its two pairs of tubercles much developed, with a deep groove between them; the incisors gradually increasing in size to the median pair, which are not expanded at their summits; the molars with largely-developed supplemental lobes.

Horns rising immediately above the orbits, curved backwards, annulated.

Hab. Africa.

Æ. leucophæus.

Æ. niger.

ORYX.

A suborbital fissure, but no fossa, the masseteric ridge not extending high; the auditory bulla large and compressed; the basioccipital bone with its tubercles well-developed; the molars with supplemental lobes.

Horns straight or gently curved, annulated, placed in a line with the face.

Hab. Africa.

O. gazella.

O. leucoryx.

It is only in Mr. Cumming's collection that I have seen entire skulls of the Gemsbok, and the lower jaw being absent, I could not ascertain the character of the incisors. The skull of the *Leucoryx* I have not seen.

ADDAX.

A small suborbital fissure, but no fossa; the masseteric ridge ascending before the orbit; the auditory bulla large, prominent, and compressed; the basioccipital bone with its anterior pair of tubercles slightly, the posterior well, developed; the median incisors expanded at their summits; the molars with supplemental lobes.

Horns nearly in a line with the face, annulated, spirally twisted.

Hab. Africa.

A. naso-maculata. I have seen but one skull of this animal, and that is a young one, in the Society's collection, still retaining the whole of its milk dentition.

Before proceeding to the Sheep and Goats, the Nyl-Ghau requires to be introduced. It seems to stand alone, not having a decided affinity for any other genus.

PORTAX.

The nasal opening rather small, with the nasal bones small and narrow; a minute suborbital fissure; no fossa, but a smooth line upon the lacrymal bone; the masseteric ridge not extending high; the auditory bulla moderate, bulbous, compressed; the basioccipital

bone with the posterior tubercles moderately developed, the anterior ones scarcely at all ; the molars with supplemental lobes.

Horns short, round, vertical, slightly bent forwards.

Hab. India.

P. picta.—The only skull that I have seen (that in the British Museum) wants the incisor teeth, so that I could not ascertain their structure. The smooth line upon the lacrymal bone terminates in a small foramen, but on one side is continued for some distance forwards upon the maxillary bone, where it terminates in the same way; and it may even be faintly traced on the other side for some distance beyond the foramen.

CAPRA.

A small suborbital fissure, no fossa ; the masseteric ridge ascending high before the orbit ; the auditory bulla prominent and compressed ; the basioccipital flat, with its processes developed ; the middle incisors not expanded ; the molars without supplemental lobes.

Horns erect, compressed ; curved backwards and a little outwards, or twisted ; annulated or nodulous, and furnished with one or more longitudinal ridges.

Hab. The Northern portions of the Old World.

C. hircus.

C. Falconeri.

C. ibex.

C. jemlaica.

I do not see sufficient reason for separating the Jemlah Goat, as has been done, under the names of *Hemicapra* and *Hemitragus*.

Ovis.

A more or less marked, rounded, suborbital depression, but no fissure ; the masseteric ridge ascending high before the orbit ; the auditory bulla small ; the basioccipital flat, more or less expanded anteriorly by the extension of the anterior pair of tubercles, the posterior ones small ; the incisors nearly equal-sized, sloping ; the molars without supplemental lobes.

Horns broad at the base, transversely wrinkled, bent outwards, with a more or less marked spiral curve in a direction contrary to that occurring among the Antelopes, and a longitudinal ridge or angle.

Hab. The Northern hemisphere.

O. ammon.

O. nahura.

O. Vignei.

O. tragelaphus.

O. aries.

It is a matter of surprise to me that naturalists should almost universally have given *no* suborbital sinus, as characteristic of the genus *Ovis*, since it is very perceptible in the Domestic Sheep ; and in some other species, especially the *O. ammon*, judging by the appearance of the stuffed specimens, and by the fossa upon the skull, it must be of very considerable size. I do not perceive it, however, in the *O. tragelaphus*, nor in the *O. nahura*. Although Mr. Gray maintains the long-established error, the observations of Mr. Ogilby and Mr. Hodg-

son agree with my own in this respect ; the latter gentleman, who far exceeds Mr. Gray in the number of generic divisions, even separates *O. nahura* and *O. barkel* as a distinct genus under the name *Pseudoris*, on account of the absence of "eye-pits."

OVIROS.

A small depression in front of the orbit ; no fissure ; the masseteric ridge ascending before the orbit ; the auditory bulla of moderate size ; the basioccipital bone broad and flat, with a ridge and a fossa on each side ; the anterior part of which is rough ; the fossa at the side of the occipital condyle filled up and produced into a blunt process, upon which the articulating surface is continued ; the molars without supplemental lobes.

Horns broad at the base, tapering, pressed downwards against the sides of the head, and the points bent upwards.

Hab. The North Polar Regions.

O. moschatus.—This animal, which derives its name from its general aspect being intermediate between that of the Ox and that of the Sheep, has generally been placed among the Bovine forms. Taking the aggregate of its characters, it appears to me to be at least as nearly, if not more, allied to the Sheep, but should most properly stand alone.

The remaining genera constitute the true Bovine type, and agree among themselves in most characters of the skull. I fear that Mr. Gray's distinctions, in the extent of the intermaxillary bones upon the sides of the nasal aperture, will not always hold good. Their general cranial character may be given first ;—

No suborbital fissure, nor fossa ; the masseteric ridge ascending rather high before the orbit ; the auditory bulla moderate, compressed ; the basioccipital bone with its tubercles well-developed, and a deep groove between them ; the incisors nearly equal-sized, slightly bending outwards, and the molars with well-developed supplemental lobes.

Bos.

Horns placed upon the extremities of the ridge terminating the occipital plane, directed outwards.

Hab. Europe and Asia.

B. taurus.

B. gaurus.

B. frontalis.

B. bantiger.

BISON.

Horns round, situated in a plane anterior to that of the occiput, directed outwards and curved upwards.

Hab. The Northern Temperate regions.

B. urus.

B. grunniens.

B. Americanus.

The last-named species is a true Bison, as the position of the horns, No. CCXII.—PROCEEDINGS OF THE ZOOLOGICAL SOCIETY.

and the woolly fur, make apparent ; the fur being generally more copious, may reasonably be expected to extend further upon the muzzle ; and the generality of instances proves that the extent of naked surface may differ in very nearly allied species, and is not sufficient to warrant generic distinction. Therefore I do not think it advisable to adopt the genus *Poëphagus*.

BUBALUS.

Horns attached in a plane anterior to that of the occiput, flattened or trigonal, inclined outwards and backwards, with the point bending upwards.

Hab. Southern Asia, its islands, and Africa.

B. buffelus.

B. depressicornis.

B. brachycerus.

B. Caffer.

Although Major Smith was deceived as to the affinities of the Anoa, later as well as earlier naturalists have assigned it to its true place, and a glance at the stuffed specimen in the British Museum leaves the matter beyond a doubt. I have examined the skull in the Museum of the College of Surgeons, and cannot see that it has even a title to generic distinction. Naturalists seem at all times to have been prone to assign generic rank to whatever was mysterious or difficult to classify, and I can in no other way account for this species being made a genus.

It will be seen that my endeavour has been rather to ascertain and demonstrate whatever natural degrees of relationship exist among the species of this family, than to compose a system for mere convenience of reference ; but so far from that being any hindrance to the practical adoption of my views, I think that in arranging the specimens in a museum, or the materials of a work, it will generally be found more convenient to be able to dispose the members of a natural group in whatever order may suit our immediate object, than to be compelled to place them in accordance with the stringent laws of a purely analytical method ; and that for the purpose of referring a new species to its true location, when we have not the means of observing all characters that may be necessary for the determination of a series of natural affinities, the external characters which can be assigned to a group when its limits are well made out, will be found sufficient ; while on the other hand, not only the external characters, but sometimes even those of anatomical structure, will, in a group which has not been previously subjected to a full and careful examination, be as the letters of an unknown language, often leading into error and confusion.

With regard to nomenclature, I have used such names as I find most generally adopted by later naturalists who have given attention to this subject, generally taking, where I had a choice, such as appeared to have been of earliest date ; and as I only enumerate such species as I have seen, I must not be considered, although I have omitted a few which appear to be varieties, as rejecting all that are left out.

2. DESCRIPTION OF A NEW GENUS OF THE FAMILY MELANIANA, AND OF MANY NEW SPECIES OF THE GENUS MELANIA, CHIEFLY COLLECTED BY HUGH CUMING, ESQ., DURING HIS ZOOLOGICAL VOYAGE IN THE EAST, AND NOW FIRST DESCRIBED. BY ISAAC LEA AND HENRY C. LEA, PHILADELPHIA *.

Genus PACHYCHILUS †.

Testa conica. Apertura ovata, basi integro. Labrum crassum. Columella supernè incrassata. Operculum suborbiculare, corneum.

The genus *Melania* has been found to embrace such a vast number of species in various parts of the globe, that it has become very desirable to separate any definite group with sufficient persistent characteristics. The thickened lip sufficiently distinguishes the proposed genus from *Melanopsis* and *Melania* ‡. It differs from *Melanopsis* also in its having no sinus, while it resembles it in the possession of a thickened columella above. From *Melania* it differs also in having this callous columella. The species on which it is proposed to found this genus has a mouth looking like a thick-lipped *Bulinus*. The operculum differs somewhat from that of any *Melanian* I have seen. Its polar point is subcentral, from which two or three spiral revolutions are made; then a thinner margin surrounds these spirals.

The animal has not been observed, and may and probably will prove very different from *Melania*. Its proper position, however, in the system will most likely be found to be between *Melanopsis* and *Melania*, and there I would at present place it.

A second and very distinct species may be added to this genus—the *Melania lævissima*, Sowerby, described in Deshayes' edition of Lamarck. It inhabits Colombia, and is a shorter, wider, and much thicker shell, with a large white mouth.

PACHYCHILUS CUMINGII. *P. testâ lævi, elevato-conicâ, subcrassâ, nitidâ, fusco-nebulosâ; spirâ elevatâ, acuminatâ; anfractibus undecim, convexiusculis; suturis linearibus; aperturâ parviusculâ, subrotundâ, ad basim rotundâ, intus fuscâ; labro valdè expanso; columellâ supernè incrassatâ.*

Hab. Large rivers, Copan, Central America.

Length 1·4, diam. ·5 of an inch.

Remarks.—This is a very remarkable shell among the *Melaniens*. It is of fine symmetry, the whorls being very regular to the apex. The brownish cloudiness gives the whole surface a dark hue, while the smoothness of the whorls gives it almost a polished appearance. It differs very much in form from *Melania lævissima*, Sow., which naturally belongs to the same genus, and which is adopted above; but it has the same character of mouth and exterior colour. Both

* All the species described are in the Cabinets of Hugh Cuming and Isaac Lea.

† Παχὺς, *thick*, and χεῖλος, *lip*.

‡ Lamarck describes the family *Melaniens* as having a sharp outer lip, "le droit toujours tranchant;" but this genus naturally belongs to *Melania*, *Melanopsis*, and *Pirena*.

species under the microscope exhibit very minute revolving striae. The aperture is rather more than one-fourth the length of the shell. The operculum has its polar point subcentral.

The genus *Melania* of Lamarck abounds in a most extensive number of species, and is undoubtedly the most interesting of the genera of the family *Melaniina*. It is distributed round the whole circumference of the globe, and inhabits the fresh waters of America at least as far north as 45° latitude, and it probably exists quite as far south, as it is found in New Zealand. In the north of Europe there is not a single species known, while very few are found in the southern part of that quarter of the world. In the middle, southern and south-western portions of the United States, the greatest number of species seem to be developed on this continent; and in the States of Kentucky, Ohio, Tennessee and Alabama they are the most profuse, and present an almost endless variety of forms, extending to an incredible number of species. The rivers and lakes of India and Africa have not yet been well explored; but while they present some of the most striking and beautiful species, it may be doubted if they abound in the variety of forms which are found in the United States. The Philippine Islands form a most prolific district, where the development of these forms seems to have been greatly extended. Mr. Cuming, with an industry, energy and perseverance which portray the true naturalist, devoted several years to the Mollusca of this remarkable group of islands, and his reward has been, the discovery of a vast number of species heretofore unknown to science; and he well deserves the gratitude of all students of this branch of natural history for his devotion to the collection of a museum, almost, if not quite, unequalled in the Mollusca.

MELANIA CANALIS. *M. testâ lævi, acuto-conoïdæ, subtenui, tenebroso-castanæ, flammis longitudinalibus ferrugineis ornatâ; spirâ elevatâ, ad apicem costatâ; suturis impressis canaliculatisque; anfractibus duodecim, subconvexis; aperturâ ovatâ, ad basim patulâ, intus albâ.*

Hab. Small streams, island of Guimaras, Philippines.

Length 2·1, diam. ·6 of an inch.

Remarks.—This is rather a large and somewhat robust species. The full-grown specimens are of a dark chestnut-brown, the younger sometimes a pale horn-colour, with longitudinal flammate marks, nearly equidistant, and with distinct minute transverse striae. The most remarkable character of this species is the impressed and rather sharp channel at the junction of the whorls. The aperture is nearly one-third the length of the shell, and the base is expanded, the columella below being flattened.

MELANIA FÆDA. *M. testâ lævi, conoïdæ, subcrassâ, tenebrososâ, rufâ-nebulosâ; spirâ subelevatâ; suturis subimpressis; anfractibus decem, planulatis; aperturâ ellipticâ, subcontractâ, ad basim subangulatâ, intus tenebroso-castanæ; labro margine cærulescente.*

Hab. Rocky stream, Java.

Length 1·6, diam. ·5 of an inch.

Remarks.—In the adult specimens the edge of the aperture is bluish white, and within more or less brown. In all cases the columella is white in the four specimens under examination. They are covered nearly over the whole surface with a black deposit of oxide of iron. Near the base there are seven to ten indistinct striæ. The aperture is about one-third the length of the shell. The operculum is ovate, and does not present any peculiar character.

MELANIA SOBRIA. *M. testâ lævi, acuto-conoïded, subcrassâ, luteo-corned; spirâ elevatâ, ad apicem costatâ; suturis impressis; anfractibus duodecim, planulatis; aperturâ parvâ, subovatâ, intus albidâ, ad basim rotundatâ; columellâ regulariter curvatâ.*

Hab. Very small streams, Siquijor, Philippines.

Length 1·5, diam. ·5 of an inch.

Remarks.—A very regularly formed, light-coloured species. There are a few indistinct striæ near the base. The sutures are very regular and thread-like. The upper whorls are slightly maculate, and those nearest to the apex minutely plicate. The aperture is rather more than the fourth of the length of the shell, and is rounded at the base of the columella.

MELANIA SUBULA. *M. testâ lævi, acuto-conoïded, tenui, castaneâ; spirâ valdè elevatâ, acuminatâ; suturis impressis; anfractibus duodecim, subconvexis; aperturâ parvâ, contractâ, intus vel albidâ vel rufo-castaneâ.*

Hab. Small river in the province of Ho Ho, isle of Panay, Philippines.

Length 1·8, diam. ·4 of an inch.

Remarks.—This is a delicately formed species, very much attenuated, with six or eight impressed, small striæ at the base. In the darker specimens, the upper part of the whorl at the suture is lighter-coloured than the other part. The upper whorls are finely striate. The aperture is small, about one-fourth the length of the shell, and rounded at the base of the columella.

MELANIA ACUS. *M. testâ lævi, conoïded, subtenui, corned; spirâ acuminatâ, ad apicem costatâ; suturis subimpressis; anfractibus undecim planulatis; aperturâ parvâ, ovatâ, intus cærulescente; columellâ regulariter curvatâ.*

Hab. Small stream, Guimaras, Philippines.

Length 1·1, diam. ·3 of an inch.

Remarks.—This is a regularly formed, small species. The specimens under examination are nearly covered with a deposit of oxide of iron, which on removal displays a horn-coloured epidermis. The aperture is nearly one-third the length of the shell, and is rounded at the base.

MELANIA DERMESTOIDEA. *M. testâ lævi, politâ, subcylindraced, crassâ, tenebroso-castaneâ; spirâ subelevatâ; suturis impressis; anfractibus sex, subplanulatis; aperturâ ovatâ, ad basim canaliculatâ, intus rufescente; labro incrassato.*

Hab. Seychelles Islands.

Length .6, diam. .2 of an inch.

Remarks.—The most marked character of this species is the notched channel of the base, where the colour is rather darker. The outer lip is thick and rounded. The superior part of the whorl in some specimens is lighter in colour. In its general aspect this species resembles *Melania simplex*, Say. The epidermis is very lustrous. The aperture is nearly one-half the length of the shell.

MELANIA CONTRACTA. *M. testâ lævi, ovato-elongatâ, pallidâ, tenui; spirâ elevatâ; anfractibus novem, planulatis; aperturâ ovatâ, constrictâ, ad basim canaliculatâ, intus vel albidâ vel rufâ; columellâ contortâ reflexâque.*

Hab. Seychelles Islands.

Length .8, diam. .3 of an inch.

Remarks.—This, like the *dermestoides*, herein described, from the same locality, is remarkable for the notched channel at the base. They may easily be distinguished by the *contracta* having a more elevated spire, greater number of whorls, being of a lighter colour, and in the aperture being longer and more twisted. There is a disposition in the upper part of the columella to be thickened and rufous, and the twist and backward turn are very remarkable. The aperture is about one-third the length of the shell.

MELANIA FERRUGINEA. *M. testâ lævi, nitidâ, ventricoso-conoided, inflatâ, crassâ, ferruginâ; spirâ subelevatâ; suturis valdè impressis; anfractibus sex, convexis; aperturâ magnâ, subrotundâ, intus albidâ.*

Hab. Zanzibar, East Africa.

Length .9, diam. .4 of an inch.

Remarks.—The rather inflated form of this species gives it the aspect of some of the *Paludinæ*. A single specimen, and not an entirely perfect one, has only been submitted for examination. It seems to differ from any described species, while it has no very distinctive character. The aperture is very nearly one-half the length of the shell.

MELANIA IMPURA. *M. testâ lævi, subcylindrâ, compressâ, subcrassâ, viridi-cornâ; spirâ subelevatâ; suturis valdè impressis; anfractibus planulatis, supra geniculatis; aperturâ ellipticâ, subcontractâ, ad basim retusâ, intus albidâ; columellâ regulariter incurvâ.*

Hab. Naga, province of South Cumarines, Luzon, Philippines.

Length .9, diam. .35 of an inch.

Remarks.—The angle on the superior portion of the whorls gives this species a very distinct aspect. This angle is not very acute, but it is very marked in all the four specimens under examination. The apex in each being decollate, the number of whorls cannot of course be correctly ascertained; there may be about seven. The colour of the epidermis is uniform and of a greenish horn-colour. The aperture is rather more than one-third the length of the shell, and is rounded and retuse at the base.

MELANIA COCHLIDIUM. *M. testâ lævi, subulatâ, subcrassâ, rufocornâ; spirâ elevatâ, acuminatâ, ad apicem minutè plicatâ; suturis regulariter impressis; anfractibus tredecim, subcompressis, anfractu ultimo supra angulato, magno; aperturâ latè ovatâ, parvâ, ad basim retusâ, intus albidâ; columellâ regulariter incurvâ.*

Hab. Very small streams, islands of Siquijor and Guimaras, Philippines.

Length 1·5, diam. ·5 of an inch.

Remarks.—This is a very remarkable species, having a single elevated, revolving rib on the superior part of the last whorl, which causes a somewhat impressed channel above. The four specimens under examination from Siquijor are fresh and with perfect epidermis, which varies on the younger specimens to rather a pale horn-colour, while the more mature ones are of a reddish horn-colour. The four from Guimaras are “dead shells,” rather more robust, with a portion only of the epidermis remaining, which is rufous. The aperture is about one-fourth of the length of the shell. The operculum has its polar point near the base on the left side.

MELANIA CINCTA. *M. testâ lævi, subulatâ, subtenui, rufo-castanâ; spirâ valdè elevatâ, acuminatâ, ad apicem plicatâ; suturis impressis, linearibus; anfractibus tredecim, subconvexis; anfractu ultimo uno-vittato; aperturâ dilatâtâ, ovatâ, intus fusco fasciatâ, ad basim rotundâ; columellâ contortâ.*

Hab. India.

Length 2·2, diam. ·6 of an inch.

Remarks.—The form of this species is very much like that of *Melania aculeus* (nobis), but it is a more attenuate species. The single light band on the lower whorl seems to be peculiar to this species. It is below the middle part of the whorl, and is distinctly visible on the inside in the three specimens under examination. The upper whorls have regular, oblique, somewhat distant folds, on two of the specimens, which are crossed by minute striæ. The lower part of the whorl has indistinct striæ. The aperture is not large, being less than one-fourth the length of the shell, and it is rounded at the base. The columella is much incurved.

MELANIA LANCEA. *M. testâ lævi, subulatâ, subtenui, cornâ; spirâ elevatâ, ad apicem striatâ; suturis impressis; anfractibus duodecim, convexis; aperturâ ovatâ, intus albidâ, ad basim rotundâ; columellâ angulariter incurvâ.*

Hab. Obcatara, Society Islands.

Length 1·6, diam. ·5 of an inch.

Remarks.—This species is in form somewhat like the *M. aculeus* (nobis), but is a smaller shell and not quite so attenuate. In the four specimens under examination small striæ are distinctly marked on the superior or younger whorls, and on two of them some of the striæ are continuous on the lower whorls. The aperture is not large, being not quite one-third the length of the shell. The columella is much incurved and recurved.

MELANIA EPISCOPALIS. *M. testâ plicatâ, turritâ, subcrassâ, tenebroso-castanâ; spirâ elevatâ; suturis impressis; anfractibus subconvexis, propè suturam superiorem concavis; plicis raris, subacuminatis; aperturâ magnâ, ellipticâ, intus cærulescente; columellâ contortâ.*

Hab. A sluggish river, Malacca.

Length 2·4, diam. ·8 of an inch.

Remarks.—This is a remarkable and interesting species, and differs from any which has been described, in having rather large and somewhat distant folds rising on the upper part into nodular points, in all the four specimens submitted for examination. The apex of these specimens being truncated, the number of whorls cannot be ascertained. A perfect adult would probably present about ten. The folds are distinct on the four lower whorls only. On the middle of the lower whorl there is a slightly elevated line, below which are about six obscure striae. The aperture is large, and more than one-third the length of the shell; it is twisted, and has an elongated base. The columella is whitish and very much incurved. The operculum is more spiral than usual, and the polar point more toward the centre.

MELANIA BLATTA. *M. testâ plicatâ, elongatè conoidè, crassâ, castaneo-nigricante; spirâ elevatâ, crebrè costatâ; anfractibus planulatis, infra suturas concavis; plicis crebris ornatis; aperturâ magnâ, ovatâ, supernè angulatâ, ad basim rotundâ, intus cæruleâ; columellâ tortâ, supernè incrassatâ.*

Hab. Rapid river and small streams, Luzon, Philippines.

Length 2·6, diam. ·7 of an inch.

Remarks.—A very dark-coloured and remarkably fine species, with numerous, nearly parallel, perpendicular folds, which number some eighteen or twenty, and exist on every whorl in the eight specimens under examination. The four large ones are truncate, but the younger and more perfect would indicate the existence of about ten whorls. It differs from the *episcopalis* in being more attenuate, in having more folds and a much less twisted columella. The aperture is large, and rather more than one-fourth the length of the shell.

MELANIA COSTELLARIS. *M. testâ plicatâ, supernè striatâ, acuminatâ, subcrassâ, tenebroso-castanâ; spirâ elevatâ; suturis linearibus; anfractibus decem, subplanulatis; anfractu ultimo magno, geniculato; plicis numerosis; aperturâ parvâ, dilatâ, ovatâ, supernè angulatâ, ad basim rotundâ, intus cærulescente; columellâ incurvâ.*

Hab. Small streams in the islands of Negros, Tanhay, Siquijor; Philippines.

Length 1·5, diam. ·5 of an inch.

Remarks.—The last whorl being angular gives this species a peculiar and remarkable character, and causes a channel immediately below the suture. Several of the specimens under examination have beautiful delicate impressed lines immediately above the sutures. In the superior whorls these lines cover the whole surface. The folds

terminate on the angle, and are disposed to be nodulous there. The aperture is rounded, angular above, and not quite one-third the length of the shell. The base of the shell is rounded.

MELANIA RECTA. *M. testâ plicatâ, attenuatâ, subcrassâ, tenebrosocastanè; spirâ valde elevatâ; suturis irregulariter impressis, subcanaliculatis; anfractibus tredecim, subplanulatis; plicis numerosis; aperturâ parvâ, ovatâ, ad basim rotundâ, intus cærulescente; columellâ incurvâ.*

Hab. Very small streams, Siquijor and isle of Negros, Philippines.
Length 1·7, diam. ·5 of an inch.

Remarks.—In many of its characteristics this species is like the *M. costellaris*. It differs entirely, however, in the enlargement of the last whorl, the angle on the superior part of it, and in the channel below the suture, which are important characters in the *costellaris*. Nor has it the minute revolving lines. The folds are remarkably regular and distinct, and number about eleven on each whorl in the eight specimens under examination. On two individuals the epidermis remains quite perfect, and is deposited in regular, revolving striæ. The aperture is about one-third the length of the shell; it is rounded below and angular above, where it is slightly set off from the body of the whorl. The columella is but slightly curved.

MELANIA AUSTRALIS. *M. testâ plicatâ, conicâ, tenui, diaphand, rubiginoso-corned; spirâ costatâ, prope apicem turbinatâ; suturis impressis; anfractibus septem, convexis, ad basim striatis; plicis numerosis; aperturâ magnâ, ellipticâ, intus salmoniâ; columella tortâ; labro supernè emarginato.*

Hab. Victoria river, North Australia.
Length ·9, diam. ·4 of an inch.

Remarks.—This is a very distinct little species, and the sudden enlargement of the third whorl below the apex gives it a somewhat turbinated appearance. The folds do not on the lower whorl reach the suture, and above and below these folds there are minute revolving striæ. The aperture is more than one-third the length of the shell. The outer lip is slightly crenulate and remarkably incurved near to its junction with the body whorl.

MELANIA TORNATELLA. *M. testâ plicatâ, fusiformi, crassâ, corned, infernè lineatâ; spirâ acuminatâ; suturis irregulariter impressis; anfractibus novem, convexiusculis, ad apicem mucronatis, in medio concavis; plicis numerosis, crebris; aperturâ constrictâ, elongatâ, intus albâ; labro supernè incisâ; columellâ lævi, crassâ, contortâ, reflexâ.*

Hab. Shallow rivers, Tanhay, isle of Negros, Philippines.
Length ·9, diam. ·35 of an inch.

Remarks.—This belongs to a very remarkable group of *Melania*. The emargination of the outer lip, above the middle of the whorl, is strikingly characteristic of the group. It causes a slight flatness or convexity of the whorl, as well as a curve in the numerous ribs, which cover the whole surface in this species, except where it is superseded

by the transverse lines on the lower part of the whorl. These lines are remarkably parallel, regular and well-impressed, and in the four specimens under examination are six in number. The folds are like ribs, very numerous, closely set, and very distinct. The form of this species, described above, is very like *Tornatella*, and the twist in the columella also resembles that genus. The ribs continue on the apex and give it a scalariform appearance. The aperture is nearly one-half the length of the shell. The edge of the lip, below the emargination, is slightly crenulate. The columella is very thick towards and at the base, where it is so retuse as to permit the inside to be seen. One of the specimens is rubiginose at the base. No operculum accompanied the specimens.

MELANIA RUDIS. *M. testâ plicatâ, subfusiformi, crassâ, corned; spirâ subelevatâ; suturis irregulariter impressis; anfractibus planulatis transversim lineis impressis cinctis, supernè canaliculatis; plicis numerosis, crebris; aperturâ parvâ, ovatâ, intus albidâ; labro supernè emarginato; columellâ lævi, subcrassâ, tortâ.*

Hab. Amboyna.

Length 1·1, diam. ·4 of an inch.

Remarks.—Allied to *Melania tornatella*, it forms one of the emarginate group, but differs in the size of the aperture and in the form of the ribs, which are transversely cut by numerous fine lines, in groups, which lines traverse the whole whorls. The aperture is about one-third the length of the shell, and the lip is crenulate. The three specimens under examination are all truncate at the apex, and the number of whorls therefore not ascertained. It has the spiral operculum usual to *Melania*.

MELANIA MICROSTOMA. *M. testâ plicatâ, subfusiformi, subcrassâ, luteo-corned; spirâ elevatâ; suturis irregulariter impressis; anfractibus octo, planulatis, transversim lineis impressis cinctis, supernè canaliculatis; plicis numerosis, crebris; aperturâ maximâ, ovatâ, ad basim truncatâ, intus cærulescente; labro supernè emarginato; columellâ lævi, ad basim subcrassâ tortâque.*

Hab. Mountain streams, isle of Negros, Philippines.

Length ·9, diam. ·3 of an inch.

Remarks.—This belongs to the group with emarginate lip, along with *M. rudis* and *M. tornatella*. It is a more slender species, more subulate, and has a smaller aperture than either. It takes more the form of *Terebra*. It has groups of lines which decussate the ribs as in the *rudis*. The aperture is not one-third the length of the shell, and the lip is crenulate. No operculum was received with the shells.

MELANIA TRANSVERSA. *M. testâ plicatâ, pyramidatâ, crassâ, corned, castaneo-maculatâ; spirâ elevatâ; suturis irregulariter impressis; anfractibus subconvexis, transversim lineis impressis cinctis; costellis verticalibus raris; aperturâ parvâ, obliquè transversâ, rhomboided, intus maculatâ et cærulescente; labro terebræformi, crenulato; columellâ contortâ, supernè incrassatâ, infernè emarginatâ.*

Hab. Guiana.

Length 1·6, diam. ·5 of an inch.

Remarks.—This species is remarkable for the unusual obliquity of its aperture and its auger-shaped lip. In its ribs and decussate striæ it resembles the group consisting of *M. tornatella*, *M. rudis* and *M. microstoma*, but it has not the emarginate lip and therefore does not belong to them. The emargination at the base of the columella is quite a different character, and is very remarkable in this species, representing as it does *the bite* of the auger. The chestnut-coloured spots are small, but so distinct as to mark the interior of the shell, which is white and thick. The two specimens under examination are both truncate at the apex, and the number of whorls not ascertained, probably about ten. The aperture is rather more than one-fourth the length of the shell. The operculum is spiral, with the polar point nearly in the centre and with at least five revolutions, which is unusual with *Melaniæ*. It is allied to *M. truncata*, Lam. (*semiplicata*, Fer.), but is less cylindrical and differs somewhat in the aperture.

MELANIA MAXIMA. *M. testâ striatâ, elevato-conoïdæ, crassâ, corned; spirâ valdè elevatâ; suturis linearibus; anfractibus duodecim, planulatis; striis magnis, raris, tenebrosis; aperturâ magnâ, rhomboïdæ, intus albidâ; columellâ valdè contortâ.*

Hab. Copan, Central America.

Length 3, diam. 1·1 inches.

Remarks.—This very large species has a remarkable outline, forming a perfectly regular, rather obtuse cone above. The aperture is very large, and in the youngest of the three specimens the coloured striæ are very distinct within. Under the microscope minute revolving lines may be observed over all the whorls. The aperture is rather more than one-third the length of the shell. The operculum has five revolutions and is very much like that of *M. transversa*, the polar point being nearly central.

MELANIA MINDORIENSIS. *M. testâ striatâ, elevato-conoïdæ, subtenui, pallidâ, ad apicem acuminatâ; spirâ elevatâ; suturis impressis; anfractibus duodecim, subconvexis, striis crebris; aperturâ magnâ, ellipticâ, intus albâ; columellâ incurvatâ tortâque.*

Hab. Small streams, Puerto Galero, isle of Mindoro, Philippines.

Length 1·9, diam. ·7 of an inch.

Remarks.—The outline of this species is very regular, tapering to a fine point. There are five specimens under examination, all of which have raised striæ over the whole of the body whorl. Some of the specimens have the two next whorls ribbed, which ribs, the striæ decussating, form granular elevations. The remaining whorls are perfectly smooth, with a few delicately impressed transverse lines. Some have brown spots, which towards the apex are more numerous and flammate. The aperture is more than one-third the length of the shell. The operculum has its polar point on the lower edge, and the curved lines of growth do not make one-eighth of a revolution.

MELANIA INDEFINITA. *M. testâ striatâ, elevato-conicâ, sub-*

crassâ, tenebroso-corned; spirâ subelevatâ; suturis valdè impressis; anfractibus convexis, infra suturas impressis, striis crebris impressis; aperturâ parvâ, ovatâ, intus cærulescente, ad basim rotundâ; columellâ regulariter incurvâ.

Hab. Naga, Luzon, Philippines.

Length 1.6, diam. .5 of an inch.

Remarks.—The species has a very close resemblance to the striate varieties of *M. Virginica*, Say. The three adult specimens under examination are truncate, and the number of whorls therefore not ascertainable, but probably about nine. The impressed revolving lines are somewhat distant, regular and delicate. Between these, under the microscope, may be seen very minute revolving striæ. The aperture is about one-fourth the length of the shell. The operculum has its polar point near to the edge of the lower margin.

MELANIA LUZONIENSIS. *M. testâ striatâ, conicâ, subtenui, tenebroso-corned; spirâ erodâ; suturis impressis; anfractibus sex, convexiusculis, transversim lineis rugosis impressis cinctis; aperturâ magnâ, elongato-ellipticâ, intus rubiginosâ; columellâ albâ tortâque.*

Hab. Small streams, Calanang, province of Bai, Philippines.

Length 1.1, diam. .5 of an inch.

Remarks.—There is no peculiarity in the outline of this species, and the most striking character is perhaps in the impressed lines, which are somewhat distant, having minute numerous wrinkles across the groove. They are very distinctly visible under the microscope, and do not seem to have been observed in any other species. The superior part of the whorls is disposed to be granose, and one specimen has four rows of granules. Immediately under the sutures there is a yellow line. The aperture is one-half the length of the shell. The operculum has its polar point close to the lower margin.

MELANIA ALBESCENS. *M. testâ striatâ, elevato-conicâ, subtenui, albâ, lineis rufis interruptis ornatâ; spirâ acuminatâ; suturis impressis; anfractibus undecim, planiusculis, lineis transversis vix impressis; aperturâ ovato-oblongâ, intus albâ, rufo-maculatâ, ad basim rotundâ; columellâ incurvâ.*

Hab. Small streams, isles of Guimaras, Negros and Siquijor, Philippines.

Length 2.5, diam. .9 of an inch.

Remarks.—This is a very regularly formed and graceful species, with rather a high and tapering spire. The impressed revolving striæ are chiefly on the body whorl. The most striking characteristic is the numerous interrupted delicate brown lines, which cover nearly the whole of the whorls and are closer and better defined towards the apex. In some specimens there are beautiful brown spots on a white ground, below the sutures. The aperture is about one-third the length of the shell. The operculum has its polar point close to the lower margin on the left. There is a very great difference in the size and thickness of the specimens. Some of the old are very large, heavy, and covered with the oxide of iron, showing

beneath a brown epidermis and white nacre. In these the peritreme is very thick, and the columella more remarkably thick than heretofore noticed in any *Melanian*.

MELANIA HASTULA. *M. testâ striatâ, nonnunquam plicatâ, elongatè subulatâ, diaphanâ, tenui, fuscâ, striis transversis crebris costulas decussantibus; spirâ acuminatâ; suturis linearibus; anfractibus plano-convexis; aperturâ parvâ; ovatâ, intus vel fuscâ vel albâ; columellâ incurvâ tortâque.*

Hab. Various streams of Siquijor, Cagayan, Mindanao, and other Philippine Islands.

Length 3·3, diam. ·8 of an inch.

Remarks.—A very attenuate and greatly varied species, some being smooth with few striae, others with striae over the whole surface, and others again with numerous folds. In some of the specimens under examination the apex is eroded in a very unusual manner, the outer portion of the whorls there being so much decomposed as to present little more than the central column. Some of the specimens are dark brown, others are horn-colour with brown spots. There are probably about twelve whorls. Although some of the specimens have more or less distinct, somewhat distant folds, there are others which have no folds whatever. This species is placed among the striate group, as striae are found more or less developed on every specimen. The striae immediately below the suture are more deeply impressed and cause a slight groove. A variety from Camiguing is flatter on the whorls and less disposed to plication. The aperture is not quite one-fourth the length of the shell, is rather open and somewhat patulous below. The operculum has its polar point near to the margin on the left.

MELANIA JUNCEA. *M. testâ striatâ, elongatè subulatâ, tenui, tenebroso-fuscâ, infra suturas luteo-lineatâ; spirâ attenuatâ; suturis valdè impressis, anfractibus undecim, convexis, lineis transversis impressis; aperturâ parvâ, ovatâ, intus fuscâ; columellâ valdè incurvâ contortâque.*

Hab. Lake of Taal, province of Batanos, and small streams in Luzon, Philippines.

Length 2, diam. ·5 of an inch.

Remarks.—An attenuate and gracefully formed species. Some of the specimens are of a dark rich brown, others are flammate. Two have very small incipient folds on nearly all the whorls, others have a few towards the apex. From the same locality are four specimens, which, while they differ but little in form, are very different in colour, being yellowish, with longitudinal flammate brown marks. This variety answers very closely to *M. flammulata*, Von dem Busch, 'Conchylien,' &c. by Dr. Philippi, tab. 1. fig. 3, 4. The aperture is about one-fourth the length of the shell and is rather small, with a patulous lip having a whitish border. The operculum has its polar point rather near to the margin. Gualtierus (tab. 6. fig. G) gives a drawing of a freshwater shell closely resembling this variety. Another variety is rather thinner, diaphanous, horn-colour, and obscurely maculate.

MELANIA CONULUS. *M. testâ minutè et crebriusculè striatâ, conicâ, subtenui, fuscâ; spirâ obtusâ; suturis linearibus; anfractibus septem, planulatis, uno-vittatis; aperturâ elongato-ovatâ, ad basim angulatâ, intus fuscâ; columellâ tortâ.*

Hab. Small streams, Fernando Po, West Africa.

Length 1.4, diam. .5 of an inch.

Remarks.—This interesting species is remarkable for its peculiar striæ, which cover the whole surface of all the whorls. The lines are irregular, and so minute as to require the microscope to detect them. A little above the middle of the whorl there is an obscure, dark, rather broad band. The middle of the whorl is somewhat angular. The aperture is not quite one-half the length of the shell, and is somewhat angular below.

MELANIA OBRUTA. *M. testâ striatâ, conoideâ, crassâ, bivittatâ, fuscâ; spirâ subelevatâ; suturis impressis; anfractibus septem, convexiusculis, lineis crebris elevatis; aperturâ parvâ, subpatulâ, intus albâ et bivittatâ, ad basim emarginatâ et retusâ; labro crenulato et arcuato.*

Hab. —?

Length 1.3, diam. .5 of an inch.

Remarks.—In general form and outline this species is very like to the striate variety of *M. Virginica*, Say. It differs in being thicker and in having a crenulate and patulous lip. In the four specimens submitted, the two dark brown bands are beautifully distinct inside, and stop short of the margin. Three specimens have a suddenly enlarged body whorl. Two of the specimens have obscure, longitudinal brown marks. The aperture is about one-third the length of the shell, is very much curved on the edge of the lip, and disposed to be canaliculate at the base. The striæ are coarse and elevated.

MELANIA TURRICULUS. *M. testâ striatâ, conoideâ, subtenui, obscurè maculatâ, cornéâ, spirâ subelevatâ; suturis impressis; anfractibus novem, convexiusculis, lineis subraris impressis, superne angulatis; aperturâ parvâ, subconstrictâ, intus albâ et obscurè maculatâ, ad basim rotundâ; columellâ regulariter curvatâ.*

Hab. Small rivers, Calanang, province of Bai, Luzon, Philippines.

Length 1.2, diam. .4 of an inch.

Remarks.—This species, like *M. obruta*, resembles in size and outline very closely *M. Virginica*, Say. It differs from the former in being less thick, in being maculate and not banded, and in having impressed lines. It differs from the latter in being maculate, and in being angular immediately under the suture. The aperture is rather more than one-third the length of the shell, angular above and rounded below. The operculum has its polar point somewhat removed from the lower margin.

MELANIA APIS. *M. testâ striatâ, conicâ, tenui, obscurè granosâ, rufo-castaneâ; spirâ obtusâ; suturis irregulariter impressis; anfractibus convexis, lineis paucis elevatis; aperturâ parvâ, sub-*

rotundā, intus rufā, ad basim angulatā; labro repando, rufo-marginato; columellā incrassatā.

Hab. Marshy places, Vera Cruz, Mexico.

Length .8, diam. .3 of an inch.

Remarks.—Neither of the four specimens under examination are perfect, all being much eroded at the apex. Under the microscope the surface may be observed to be papillose, a character rarely found in this genus, though not very uncommon in *Helix*. The aperture is rather more than one-third the length of the shell and is unusually rotund. The rufous line surrounds the peritreme. The aperture is reddish inside.

MELANIA CUMINGII. *M. testā striatā, turritā, supernè uno-carinatā, subcrassā, tenebroso-fusca; spirā valdè elevatā; suturis regulariter impressis; anfractibus planulatis, lineis raris impressis; aperturā magnā, subtriangulārī, intus cærulescente; columellā retusā contortāque.*

Hab. Very small streams, island of Siquijor, Philippines.

Length 2.5, diam. .7 of an inch.

Remarks.—This is a very remarkable species. A single specimen only was sent by Mr. Cuming, and this unfortunately is by no means perfect. There is a good deal of ferruginous matter deposited over the surface, and the apex is so much eroded that the number of whorls cannot be well ascertained, perhaps about nine. The turrited form of the shell is very notable. Immediately under the suture there is an elevated and cordlike line, slightly angular on the superior part. Below this the whorl is slightly impressed. Part of the surface is wrinkled by the transverse striæ decussating longitudinal lines. The aperture is about one-third the length of the shell, and remarkable for its triangular form. The columella is unusually white, which shows in contrast with the dark epidermis. The operculum is large and thick, having its polar point near to the lower border.

MELANIA DACTYLUS. *M. testā striatā, valdè elevatā, supernè costatā, crassā, vel fusca vel luteo-corned; spirā valdè elevatā; suturis impressis; anfractibus duodecim, convexis, lineis crebris elevatis ornatis; costellis verticalibus crebris; aperturā submagnā, subrotundatā, intus vel salmonid vel cæruleā; columellā incrassatā, salmonid tortāque.*

Hab. Small streams in Guimaras, Mindanao, Luzon and Seyte, Philippines.

Length 3.2, diam. 1 inch.

Remarks.—This is a remarkably fine, large, and protean species. There are about two dozen specimens under examination from various islands of the Philippines. The prevailing character of the surface is striate with decussating costæ on the superior whorls; but some specimens have these costæ enlarged on the lower whorls, instead of their having vanished, as on others. Some again have their costæ rising into a series of pointed tubercles. Under the microscope many numerous minute striæ may be observed to revolve parallel with the coarser ones. Another variety is quite smooth on the upper whorls,

with fewer striæ and costæ. This looks like an immature shell. The aspect of these three varieties is quite different, but I do not consider it safe to separate them into species. The aperture is rather more than one-fourth the length of the shell. The operculum is large, having several revolutions, and the polar point is near to the centre.

MELANIA CRENIFERA. *M. testâ granulatâ, acuto-conicâ, subfusiformi, subtenui, corned; spirâ granulatâ, acuminatâ; suturis irregulariter impressis; anfractibus novem, convexiusculis, ad basim striatis; aperturâ submagâ, ovatâ, intus albidâ; columellâ albâ tortâque.*

Hab. Small river in Java.

Length .9, diam. .4 of an inch.

Remarks.—Three specimens under examination are all nearly covered with granules, a fourth has but few. It is a very symmetrical little species. The aperture is rather more than one-third the length of the shell. No opercula accompanied these specimens.

MELANIA NANA. *M. testâ granulatâ, conicâ, fusiformi, tenui, diaphand, vel corned vel fuscâ, rufo-maculatâ; spirâ depressâ, granulâtâ; anfractibus sex, subplanulatis, ad basim striatis; suturis irregulariter impressis; aperturâ magâ, ellipticâ, intus vel albidâ vel fuscâ; columellâ tortâ.*

Hab. Mountain streams, isle of Negros, Philippines.

Length .6, diam. .3 of an inch.

Remarks.—The colour varies in this species owing to the number of brown spots, which differ much in different specimens. One of those under examination is horn-coloured, with a few distinct brown spots; another is quite dark in consequence of the multiplicity of them. The largest granules are immediately below the suture, and the line there is disposed to be of lighter colour. The aperture is about one-half the length of the shell.

MELANIA TESSELLATA. *M. testâ granulâtâ, elevato-conicâ, crassâ, tenebroso-fuscâ; spirâ elevatâ, crebrè granulâtâ; anfractibus planulatis, ad basim striatis; suturis irregulariter impressis; aperturâ parvâ, ellipticâ, constrictâ, crenulatâ, intus tricoatâ, ad basim canaliculatâ; columellâ subrectâ.*

Hab. —?

Length 1.10, diam. .4 of an inch.

Remarks.—There is nothing striking in the general appearance of this shell; but in looking into the interior, there will be observed a character which has not been known to exist in any other species—three elevated, revolving ribs, terminating short of the outer lip. The columella is simple, nearly straight, and ends in the angle at the sinus. These remarkable ribs may involve a difference of organic structure of the animal, in which case a new genus would be required for this species. One of the three specimens is entirely white inside, the other two have dark bands. The apex being eroded in them all, the number of whorls cannot be ascertained, probably about nine. The aperture is about one-third the length of the shell. The operculum has its polar point near to the lower margin.

MELANIA CREBRUM. *M. testâ cancellatâ, elevato-conicâ, crassâ, tenebroso-castanâ; spirâ valdè elevatâ; anfractibus decem, convexiusculis, ad basim striis impressis; suturis impressis; aperturâ parvâ, ovatâ, intus albâ; ad basim rotundâ; columellâ incurvatâ.*

Hab. Small streams, Guimaras, Philippines.

Length 1·5, diam. ·5 of an inch.

Remarks.—The symmetry of the outline and the extreme regularity of the decussating lines over the whole of the whorls, except at the base, are distinguishing characteristics of this species. The elevated portions between the decussating lines are quadrangular and resemble brickwork. The four specimens submitted are all “dead shells,” and are partly decomposed towards the apex. The aperture is rather more than one-fourth the length of the shell.

MELANIA RETICULATA. *M. testâ cancellatâ, conicâ, crassâ, pallidâ; spirâ elevatâ; anfractibus septem, planulatis, crassè cancellatis, ad basim striatis; suturis impressis; aperturâ magnâ, trapezoidâ, ad basim angulatâ, intus albâ; columellâ incurvatâ, contortâque.*

Hab. China.

Length 1·8, diam. ·7 of an inch.

Remarks.—This is a very remarkable and distinct species, covered all over, except the lower part of the base whorl, with coarse, somewhat distant decussating striæ, which rise into nodes and form quadrangular areas. Altogether it is a rough *Cerithium*-looking species. The epidermis is remarkably thin and light-coloured, the upper portion of the spire being quite white in the two specimens under examination. The aperture is more than one-third the length of the shell.

MELANIA ACULEUS, Lea. *M. testâ lævi, nonnunquam striatâ vel granulâtâ, elongatè subulatâ, crassâ vel subcrassâ, corned vel fusco-nigricante; spirâ acuminatâ; suturis linearibus; anfractibus planulatis; aperturâ ovatâ, intus cærulescente; labro expanso.*

Hab. Siquijor, Naga, Cagayan, and others of the Philippines.

Length 2·6, diam. ·7 of an inch.

Remarks.—When this species was described by J. Lea in 1832 (*Trans. Am. Phil. Soc.*), he had seen but a single specimen, which had neither granules nor striæ. Among the large quantity of this genus taken by Mr. Cuming in his Eastern voyage, were about forty specimens of this singularly protean species. Were there but few, and these as different as many of them are, no one would hesitate to consider them as distinct species. But the large number and extraordinary difference in them enables one, or rather compels one to keep them in a group as curious divergent varieties. When we compare the large smooth variety with the small variety covered with granules, it is difficult to believe that they may have come from a common parent, but the *nuance* is too complete in the series to admit of a doubt.

It was deemed advisable to re-describe this species, so that it might
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embrace the various forms which it takes in the specimens now submitted by Mr. Cuming from various localities.

MELANIA DIADEMA. *M. testá spinosá, acuminato-ovatá, transversim lineatá, subpapyraceá, diaphaná, pallio lutescente; spirá scalariformi, acutá; suturá lineatá; anfractibus octo, supernè angulatis, planis supra et infra; angulo spinis instructo; spinis magnis, crebris, regularibus, brevibus, eversis, aliquando decurrentibus; lineis transversis, minimis, decussatis; anfractu ultimo bullato, ad basim lineato; aperturá magná, ovatá; columellá albidá, incurvá; epidermide hispídá.*

Hab. Small streams, isle of Guimaras, Philippines.

Length 1·4, diam. ·8 of an inch.

Remarks.—Differs from *M. amarula* in the thinness of its substance, and regularity and closeness of its spines, which are all bent outwards, at a regular angle.

MELANIA CORNUTA. *M. testá spinosá, elongato-ovatá, crassá, fuscescente vel viridescente; spirá exsertá, scalariformi, apice truncatá; suturá lineari; anfractibus medio angulatis, supernè subconcavis; angulo spinis instructo; spinis magnis, brevibus, incurvis, raris, acutis, basi latissimis, distortis, decurrentibus, anticè canaliculatis; anfractu ultimo magno, ad basim transversim striatulo; aperturá magná, ovatá; columellá lacted.*

Hab. Madagascar.

Length 1·5, diam. ·9 of an inch.

Remarks.—The spines are short, stout, and irregularly bent, presenting the appearance of horns, and distinguishing the shell from *M. amarula*, which it otherwise somewhat resembles.

MELANIA ACANTHICA. *M. testá spinosá, ovato-turritá, varicosá, transversim lineatá, subtenui, fuscá; spirá elongatá, conicá, scalariformi; apice truncatá; suturá lineari; anfractibus supernè angulatis, varicibus distortis; angulo spinis instructo; varicibus magnis, regularibus, subobliquis, supernè in spinis productis; spinis longis, tenuibus, irregularibus, extortis; lineis transversis, crebris, parvis, subalternantibus; anfractu ultimo parvo, ad basim lineato; aperturá ellipticá, infernè effusá; labro infernè producto; columellá parvâ, infernè incrassatâ.*

Hab. Manilla and isle of Negros, Philippines.

Length ·8, diam. ·4 of an inch.

Remarks.—Bears some resemblance to *M. scabra*, Férussac, and *M. bellicosa*, Hinds.

MELANIA ZEYLANICA. *M. testá lævi, ovatá, crassá, nitidá, albidá aut virido-fusca; badio flammulatá, spirá brevi, acuminatá, apice acutá, aliquando erodá; suturá lineari; anfractibus quinque, convexis, ad suturam superiorem impressis, maculis flammulatis aut sagittatis badiis; anfractu ultimo magno, bullato; basi lævi; aperturá ovato-rotundá, supernè angulatá, infernè rotundatá, intus albidá; columellá magná, albá, supernè incrassatá, infernè curvatá.*

Hab. Seychelles and Ceylon.

Length .9, diam. .6 of an inch.

Remarks.—The markings are very variable, being sometimes oblique, zigzag lines, extending over the whole surface of the whorls, sometimes sagittate or short zigzag spots in transverse series. Indeed some specimens are of a uniform dark green. The last whorl sometimes has two impressed transverse lines. The mouth is nearly two-thirds the length of the shell.

MELANIA POLYGONATA. *M. testâ tuberculatâ, elevato-conicâ, striatâ, crassâ, nigrâ; spirâ elevatâ, conicâ, apice erosâ; suturâ pæne obsoletâ, flexuosâ; anfractibus supernè et infernè striatis; medio angulatis; angulo serie unicâ tuberculorum instructo; tuberculis maximis, transversè angulatis, lævibus; striis transversis raris; anfractu ultimo magno; basi crebrè striatâ; aperturâ supernè valdè acutâ, infernè productâ et effusâ, intus albidâ; columellâ albâ, flexuosâ; operculo parvo, subcentrali.*

Hab. Copan, Central America.

Length 3.5, diam. 1.3 inch.

Remarks.—One of the largest and finest of the *Melaniæ*. The upper whorls are generally covered with a thick, smooth deposit, obliterating the sculpture. On them the tubercles appear to degenerate into elevated costæ. The operculum is much smaller than the mouth. The tubercles and striæ sometimes produce brown marks on the columella and inside the aperture.

MELANIA DENTICULATA. *M. testâ spinosâ, ovato-turritâ, transversim striatâ, denticulatâ, tenui, diaphanâ, ferruginè, maculis badiis minutis linearibus; spirâ exsertâ, conicâ, scalariformi, apice acuminatâ; suturâ lineari; anfractibus septem, supernè angulatis, angulo denticulatis; denticulis parvis, acutis, obliquis; striis transversis, parvis, alternantibus, rugosis, maculatis, lineolis longitudinalibus minutissimis decussatis; anfractu ultimo parvo, ad basim striato; aperturâ ovatâ, infernè effusâ; columellâ flexuosâ, tenui.*

Hab. Mountain streams, isle of Negros, Philippines.

Length .6, diam. .3 of an inch.

Remarks.—Allied to *M. spinulosa*, Lam., but may be distinguished by its abrupt denticulations.

MELANIA ARMILLATA. *M. testâ cancellatâ, ovato-turritâ, crassiusculâ, graniferâ, viridescenti; spirâ elevatâ, subovatâ, apice acutâ; suturâ parvâ, crenatâ; anfractibus undecim, planatis, propè suturam superiorem angulatis, supernè albidis, costis longitudinalibus obliquis graniferis crebris; granulis rotundatis, albidis; anfractu ultimo supernè compresso, infernè subturgido; basi transversè striatâ; aperturâ ovatâ, supernè acutè angulatâ, infernè rotundatâ et effusâ; labro infernè producto; columellâ infernè angulatâ, supernè rectâ.*

Hab. India.

Length 1.4, diam. .5 inch.

Remarks.—Immediately below the angle of the whorls there is

apt to be a larger series of granules, with a very small one succeeding it.

MELANIA COCHLEA. *M. testâ subspinosâ, turratâ, costatâ, striatâ, tenui, fulvâ, maculis badiis; spirâ scalariformi, ovato-acuminatâ, apice acutâ; suturâ lineari; anfractibus decem, infernè subconvexis, supernè angulatis et concavis; costis obliquis, longitudinalibus, anfractuum in angulo elevatis et acutè mucronatis, supernè vix obsoletis; striis transversis, minutis, aliquando obsoletis; anfractu ultimo parvo, ad basim striato; aperturâ ovalâ, supernè acutâ, infernè effusâ.*

Hab. —?

Length 1', diam. .4 of an inch.

Remarks.—On the last whorl of the only specimen submitted, the costæ are almost obsolete. The striae are strongest near the sutures, and scarcely visible at the middle of the whorls.

MELANIA LATERITIA. *M. testâ cancellatâ, acutè ovalâ, compressâ, crassiusculâ, striatâ, graniferâ, albidâ, virido-fusca, rufo fasciatâ aut atrâ; spirâ elevatâ, plerumque scalariformi, apice acutâ aut erodâ; suturâ impressâ, crenatâ; anfractibus decem, planatis, supernè angulatis, supra angulum sæpe albidis; striis transversis crebris graniferis; granulis quadratis, abruptis, planatis, seriebus longitudinalibus positis; anfractu ultimo magno, subcompresso; basi graniferâ; aperturâ ovalâ, supernè acutè angulatâ et sinuatâ, infernè latâ, expansâ et retusâ, internè sæpe fasciatâ; columellâ contortâ; operculo parvo, ovato.*

Hab. Philippines.

Length 1.6, diam. .7 of an inch.

Var. α. *Anfractibus supernè graniferis, infernè striis transversis impressis; basi vix lævi, striis raris.*

Var. β. *Striis graniferis alternantibus.*

Remarks.—A very variable species as to size, colour and sculpture. The operculum differs much in some individuals in both its shape and apex. This shell bears some resemblance to the *M. granifera*, Lam. Its most remarkable characteristic is its square, flattened granules, bearing some resemblance to brickwork.

MELANIA MODICELLA. *M. testâ lævi, ovato-conicâ, crassâ, nitidâ, virido-fusca; spirâ conicâ, brevi, apice acutâ, sæpe erodâ; suturâ lineari; anfractibus quinque, convexis, rapidè crescentibus, prope suturam superiorem depressis, prope suturam inferiorem striis parvis transversis duabus aut tribus; anfractu ultimo magno, medio striis tribus, basi lævi; aperturâ ovato-rotundâ, supernè subangulatâ, infernè subeffusâ, intus albidâ; labro acuto; columellâ lacteâ, curvatâ; operculo ovato, subcentrali, concentrico.*

Hab. Timor.

Length .7, diam. .5 of an inch.

Remarks.—This shell and the *M. zeylanica* may perhaps be taken as the types of a new genus or subgenus. Further investigation with respect to the animal may decide; in the meantime, the name of

RIVULINA is proposed provisionally. The general outline and operculum are those of the **PALUDINA**. In old specimens the peritreme of the mouth is continuous, but there is only a slight depression behind the columella in place of an umbilicus. The upper whorls are occasionally faintly lined or spotted with brown.

MELANIA PAGODA. *M. testâ spinosâ, turritâ, costatâ, transversim striatâ, tenui, diaphanâ, corned, maculis badiis minutis linearibus; spirâ elongatâ, subovatâ, acuminatâ, scalariformi; suturâ lineari; anfractibus decem, supernè angulatis et subconcavis, angulo spinulosi; costulis obliquis longitudinalibus, infernè obsoletis, supernè in spinulas aut denticula eversa productis, in anfractibus superioribus creberrimis et magnis, inferioribus minoribus rarioribusque; striis transversis, parvis, crebris, alternantibus, maculatis, lineolis longitudinalibus decussatis; anfractu ultimo usque ad basim striato; aperturâ ovoid, supernè acutâ, infernè effusâ.*

Hab. Isle of Guimaras, Philippines.

Length 1·4, diam. ·6 of an inch.

Remarks.—A beautiful little species, with irregular spines, very strongly marked on the upper whorls, but which sometimes diminish to denticulations on the lower. It can be mistaken for none of its congeners, except perhaps the *M. cochlea*.

3. DESCRIPTION OF FIVE NEW SPECIES OF ANODONTÆ, COLLECTED BY H. CUMING, ESQ. IN THE EAST INDIES. BY ISAAC LEA.

ANODONTA GRACILIS. *A. testâ latâ, subcylindraceâ, inæquilaterali; valvulis tenuibus; natibus subprominentibus; epidermide luteâ; margaritâ vel albâ vel purpureâ.*

Hab. Dingle, Isle of Panay.

Diam. 1; length 1·7; breadth 3·4 inches.

Remarks.—This species is more cylindrical than is usual with the *Anodontæ*, and differs from the other species taken by Mr. Cuming in this character: it is rounded anteriorly, and is subangular posteriorly. The dorsal margin is nearly straight, the basal margin is slightly emarginate, the disc being disposed to be flattish. In the specimens under examination, the beaks are all more or less eroded, but in the youngest there are slight indications of undulations. The ligament is thin and long; the marks of growth are distant and rather dark, and the epidermis in the young is yellow or greenish, in the older it is darker and brown; the anterior cicatrices are distinct; the dorsal small, and placed in the cavity of the beaks.

The five species herein described are remarkable in the character of the dorsal line, which rises immediately under the margin into a dentoid line, somewhat lamellar, and approaching in its character the more distinct tooth of the genus *Dipsas* (Leach). In the younger specimens this is much more distinctly marked, and in the older it becomes obsolete. This group of *Anodontæ*, having this dentoid character, would seem to form a natural connexion on one side with

the genus *Dipsas*, and on the other with the genus *Unio*, connecting with *U. Bengalensis*, brought by Dr. Burrough from India, and described by me in the 'Trans. Am. Phil. Soc.' vol. vi. pl. 2. fig. 3. This peculiar form of tooth, if it may so be called, is peculiar to that part of the world, so far as my observation extends; for among the numerous species examined by me from Europe, Africa and America, South as well as North, I have never met with this character developed as in those alluded to above.

ANODONTA CREPERA. *A. testâ ellipticâ, subcompressâ, inæquilaterali; valvulis tenuibus; natibus subprominentibus; epidermide tenebroso-fusca; margaritâ vel albâ vel purpureâ.*

Hab. Bongabon, Luzon, Philippines.

Diam. 1.1; length 1.8; breadth 3.3 inches.

Remarks.—Five of the six specimens under examination are purple, the sixth whitish. The outline is nearly oval. One of the specimens is obtusely biangular posteriorly; the substance of the shell is slightly thickened anteriorly; the beaks are too much eroded to observe any undulations; the ligament is rather short and thin; anterior cicatrices distinct; dorsal cicatrices small, and placed in the centre of the cavity of the beaks. The species is closely allied to *A. tenuis*, but is not quite so thin and is more transverse. Three specimens of the young have a well-defined anterior lamellar tooth and a distinct posterior raised line, which in the left valve is slightly divided. This is so marked in these young specimens, that one would scarcely hesitate to place them among the *Uniones* if we had not the adult, which have scarcely a vestige of the elevation on the dorsal line.

ANODONTA TENUIS. *A. testâ ellipticâ, compressâ, inæquilaterali; valvulis pertenuibus; natibus subprominentibus; epidermide tenebroso-fusca.*

Hab. Sual, Luzon, Philippines.

Diam. 1; length 1.7; breadth 3 inches.

Remarks.—This is very closely allied to *An. crepera* herein described, and may, perhaps, when more specimens of the old and young of both species are compared, prove only to be a variety. The specimens before me, however, differ in the *tenuis* being rather thinner and less elliptical, the outline inclining to oblong. The existence of teeth in the young, and the rudiments on the dorsal line in the adult, are very similar to the *crepera*. Of the four specimens before me, two have the naere purple and two white. The beaks are too much eroded to observe any marks of undulations. The ligament is rather long and thin. Anterior cicatrices distinct; dorsal cicatrices small, and placed in the centre of the cavity of the beaks.

ANODONTA SUBCRASSA. *A. testâ oblongâ, subinflatâ, subæquilaterali; valvulis subcrassis; natibus prominentibus undulatisque; epidermide luteo-fusca; margaritâ albidâ, colore salmonis tinctâ et iridescente.*

Hab. Laguna de Bai, Luzon, Philippines.

Diam. 1.2; length 1.7; breadth 2.9 inches.

Remarks.—It is rare to meet with an *Anodonta* of the thickness of this species, but it still is not so ponderous as the *arcuata*, Fer., or as *lato-marginata* (Nobis). It cannot be confounded with either of these species, not being arcuate, and not having compressed beaks like the former, and being oblong and thinner than the latter, as well as also being destitute of the broad margin. The substance of the shell is slightly thickened anteriorly, and the basal margin is emarginate; the beaks are submedial, and when perfect are beautifully ornate with numerous small folds which form an acute angle from the point of the beaks, nearly parallel to the line of the umbonal slope; the ligament is short and rather thick; anterior cicatrices distinct; dorsal cicatrices large, and placed in the cavity of the beaks. The colour of a single young specimen before me is salmon inclining to purple, and the adults have the cavity of the beaks tinted in this manner. In the young specimen the lamellar line on the dorsal margin is very well defined, in the adults this character is nearly obliterated.

ANODONTA CUMINGII. *A. testâ ellipticâ, compressâ, inæquilateralî; valvulis subcrassis; natibus vix prominentibus; epidermide atro-fuscâ; margaritâ albâ et iridescente.*

Hab. Malacca.

Diam. 1; length 1·9; breadth 3 inches.

Remarks.—This is an interesting species, and remarkable in the form of the dorsal line, which is thickened and raised immediately under the beak, where it is slightly incurved. This disposition to form a curve tooth reminds us of that group of *Naiades* which M. D'Orbigny discovered in the rivers of South America, and which comprise his genus *Monocondylæa*. In fact, this species forms a perfect link between the *Anodontæ* and his genus, and it is allied very closely to that species of this group which I described in the 'Trans. of the Am. Phil. Soc.' vol. viii. pl. 18. fig. 39, under the name of *Margaratina Vonderbuschiana*, from Java. The form of the tooth of the *M. Bonellii* also approaches to these. The anterior margin of the *Cumingii* is rounded, the posterior is somewhat biangular; the anterior cicatrices confluent; the dorsal cicatrices form a line across the cavity of the beaks. In all the four specimens under examination, the beaks are too much eroded to observe any undulations. An unusually dark line marks the course of the pallial impression.

4. NOTE ON TRAGELAPHUS ANGASII. BY MR. PROUDFOOT.

The skins which I exhibit to the Society are those of an old ram and of a young female Antelope, which I shot on the banks of the Mapoota River, about sixty miles above its embouchure into Delagoa Bay. This river flows through the country of Mankazana, king of the Mathlengas (or Cutfaces), which people call this animal *Inyala*.

It is also found on another river called Umcoozi, running into St. Lucie Bay in the territory of Umpana, king of the Zoolu, but very rarely.

On the Mapoota the *Inyala* are more numerous, and occur in small troops, composed of one ram and four or five females with their young.

They are always found in the densest bush: they browse chiefly on shrubs, and resemble the Bush-buck in their general habits.

The average height of an adult male is within a third of an adult Koodoo, and very much above that of a Bush-buck.

The female has no horns, resembles a female Koodoo in form, and is rather smaller in size.

July 23, 1850.

W. Yarrell, Esq., V.P., in the Chair.

The following papers were read:—

1. ON NEW SPECIES OF BIRDS FROM AUSTRALIA.

By J. GOULD, F.R.S., F.Z.S. ETC.

On the present occasion I propose to characterize seven more of the novelties sent home by Mr. MacGillivray, Naturalist to H.M.S. 'Rattlesnake.' *Vide* Proceedings, 1849, p. 109.

TANYSIPTERA SYLVIA.

Bill and feet sealing-wax red; crown of the head, wings, and five lateral tail-feathers on each side blue; ear-coverts, back of the neck and mantle black; in the centre of the latter a triangular mark of white; rump and two middle tail-feathers pure white; all the under surface cinnamon-red.

Total length, 15 inches; bill, $1\frac{1}{2}$; wing, $3\frac{3}{4}$; lateral tail-feathers, 3; middle tail-feathers, $9\frac{1}{2}$; tarsi, $\frac{1}{2}$.

Hab. Cape York, Northern Australia.

Remark.—About the size of *T. Dea*. Fine specimens are contained in the British Museum collection.

HALCYON (SYMA?) FLAVIROSTRIS.

Bill fine yellow, passing into brown at the tip; crown of the head, back of the neck, ear-coverts and flanks cinnamon-red; at the back of the neck a narrow, broken collar of black; throat and lower part of the abdomen tawny white; back and wings sordid green; rump and tail greenish blue.

Total length, 7 inches; bill, $1\frac{1}{4}$; wing, 3; tail, $2\frac{1}{2}$; tarsi, $\frac{1}{4}$.

Hab. Cape York, Northern Australia.

Remark.—Smaller, but nearly allied to the *Syma Tirotoro* of M. Lesson. Some specimens have the crown of the head black. Fine specimens are contained in the collection at the British Museum.

DRYODES SUPERCILIARIS.

Lores white; immediately above and below the eye a black mark, forming a conspicuous moustache; crown of the head and upper surface reddish brown, passing into chestnut-red on the rump and six middle tail-feathers; remainder of the tail-feathers black, tipped with white; wings black, with the base of the primaries and the tips of the coverts white, forming two bands across the wing; throat and

centre of the abdomen fawn-white; chest and flanks washed with tawny; bill black; legs fleshy brown.

Total length, $8\frac{1}{4}$ inches; bill, $\frac{1}{4}$; wing, $3\frac{3}{4}$; tail, 4; tarsi, $1\frac{1}{2}$.

Hab. Cape York, Northern Australia.

Remark.—About the size of *D. brunneopygia*. Fine specimens in the British Museum collection.

CARPOPHAGA ASSIMILIS.

Head, throat and ear-coverts grey; all the upper surface, wings and tail golden green; wing-coverts with a spot of rich yellow at the tip, forming an oblique band across the shoulder; line down the centre of the throat, chest and abdomen rich purple; under wing-coverts, vent, thighs and under tail-coverts rich orange-yellow; basal portion of the inner webs of the primaries and secondaries purplish cinnamon.

Total length, 14 inches; bill, 1; wing, 7; tail, 6; tarsi, $\frac{3}{4}$.

Hab. Cape York, Northern Australia.

Remark.—Very similar to *C. magnifica*, but considerably less in all its measurements. Specimens in the British Museum.

CHLAMYDERA CERVINIVENTRIS.

Upper surface brown, each feather narrowly margined, and marked at the tip with buffy white; throat striated with greyish brown and buff; under surface of the shoulder, abdomen, thighs and under tail-coverts light pure fawn colour.

Total length, $11\frac{1}{2}$ inches; bill, $1\frac{1}{4}$; wing, $5\frac{3}{4}$; tail, 5; tarsi, $1\frac{1}{2}$.

Hab. Cape York, Northern Australia.

Remark.—Intermediate in size between *C. nuchalis* and *C. maculata*, and distinguished from both by the fine fawn colouring of the under surface. A specimen in the British Museum of the male, apparently somewhat immature.

NECTARINIA AUSTRALIS.

Crown of the head and upper surface olive-green; over and under the eye two very indistinct marks of yellow; throat and chest steel-blue; remainder of the under surface fine yellow; bill and feet black.

Total length, $4\frac{3}{4}$ inches; bill, $\frac{1}{4}$; wing, $2\frac{1}{4}$; tail, $1\frac{1}{2}$; tarsi, $\frac{5}{8}$.

Hab. Eastern coast of Australia.

Remark.—Differs from *N. frænata* in its larger size, in its straighter bill, and in the stripe of yellow over the eye being almost obsolete. Specimens in the British Museum.

MONARCHA LEUCOTIS.

Crown of the head, back of the neck, back, primaries and six middle tail-feathers black; the three lateral tail-feathers on each side black with white tips; lores, a broad mark over the eye, ear-coverts, sides of the neck, scapularies and upper tail-coverts white; throat white, bounded below with black, the feathers lengthened and protuberant; chest and abdomen light grey; bill and feet lead-colour.

Total length, $5\frac{3}{4}$ inches; bill, $\frac{5}{8}$; wing, $2\frac{3}{4}$; tail, $2\frac{3}{4}$; tarsi, $\frac{5}{8}$.

Hab. Cape York, Northern Australia.

Remark.—About the size of *M. trivirgata*. Specimens in the British Museum.

2. A MONOGRAPH OF MACROCHISMA, A GENUS OF GASTEROPODOUS MOLLUSCA BELONGING TO THE FAMILY FISSURELLIDÆ. BY ARTHUR ADAMS, R.N., F.L.S.

MACROCHISMA, Swainson.

Animal? Shell elongated, clypeiform, radiately ribbed, extremities elevated; foramen very large, elongated, placed near the hind part, with a groove posteriorly; the hind margin sinuated.

1. MACROCHISMA MAXIMA, A. Adams. *M. testâ oblongâ, costis parum elevatis subrugosis, striisque concentricis obsolete ornâtâ, fusco radiatim maculatâ, dorso elevatâ, lateribus planulatis, extremitate anticâ rotundatâ; posticâ elevatâ, subtruncatâ; foramen dilatatum, posticè excavatum.*

Hab. — ?

2. MACROCHISMA DILATATA, A. Adams. *M. testâ ovato-oblongâ, radiatim costatâ, rubrâ, albo variegatâ, utrinque rotundatâ, lateribus dilatatis; foramen oblongum, in medio angustatum.*

Hab. — ?

3. MACROCHISMA HIATULA, Swainson, Manual of Malacology, p. 356.

Fissurella macrochisma, Sow.

- M. testâ ovato-oblongâ, radiatim costellatâ, fuscâ, subdepressâ, lateribus concavis, utrinque rotundatâ; foramen magnum, oblongum, posticè dilatatum, extremitate posticâ valdè elevatâ; margine viz sinuato.*

Hab. — ?

4. MACROCHISMA COMPRESSA, A. Adams. *M. testâ angustè oblongâ, albidâ, roseo radiatim pictâ, costellis granulosis striisque concentricis decussatâ, utrinque rotundatâ, dorso convexâ, lateribus compressis, in medio inflexis, extremitate posticâ valdè elevatâ; foramen magnum, lanceolatum, posticè dilatatum.*

Hab. — ?

5. MACROCHISMA MEGATREMA, A. Adams. *M. testâ ovato-oblongâ, albidâ, roseo radiatim pictâ, costellis rugosis striisque concentricis sculptâ, dorso subelevatâ, lateribus planulatis; foramen ovato-lanceolatum, permagnum.*

Hab. — ?

6. MACROCHISMA CUSPIDATA, A. Adams. *M. testâ ovato-oblongâ, anticè angustatâ, productâ, acuminatâ, posticè elevatâ, rotundatâ, margine valdè undulatâ, fuscâ, annulis fuscis concentricis ornâtâ, lineis elevatis et concentricis cancellatâ, circa foramen pallidâ, extremitate posticâ valdè elevatâ; foramen magnum, cuspidatum, posticè dilatatum.*

Hab. Cagayan, in insulis Philippinis; H. C. (Mus. Cuming.)

7. MACROCHISMA PRODUCTA, A. Adams. *M. testâ angusto-*

oblongâ, dorso elevatâ, convexâ, albidâ, fusco pallide variegatâ, lineis elevatis striisque concentricis obsoletè decussatâ, anticè angustâ, productâ, lateribus planulatis, extremitate posticâ rotundatâ, elevatâ; margine valdè sinuatâ; foramen perlongum, triangulare, posticè dilatatum.

Hab. in littoribus Australiæ. (Mus. Cuming.)

8. **MACROCHISMA ANGUSTATA**, A. Adams. *M. testâ angustâ, oblongâ, dorso elevatâ, utrinque rotundatâ, albidâ, lineis fuscis maculisque rufo-fuscis pictâ et tessellatâ, costellis obtusis subrugosis, lineisque depressis, concentricis, subdistantibus, sculptâ, extremitate posticâ elevatâ, margine sinuato; foramen magnum, elongatum, subtriangulare, posticè dilatatum, excavatum.*

Hab. — ?

3. **A MONOGRAPH OF MODULUS, A GENUS OF GASTEROPODOUS MOLLUSCA, OF THE FAMILY LITTORINIDÆ.** BY ARTHUR ADAMS, R.N., F.L.S.

MODULUS, Gray.

Animal with the head proboscidiform, the tentacles tapering, with the eyes near their distal ends. Foot small, the sides simple, without lobes or filaments. Operculum thin, horny, orbicular, paucispiral. Shell globose or conical, whorls nodulous; aperture round, or quadrangular, not pearly within; columella anteriorly with a prominent lamelliform tooth; umbilicus more or less open.

Modulus, Gray.—Turbo, sp. *Adanson*—*Monodonta*, sp. *Lamck*.—*Monodonta*, *Swains*.—*Morulus*, *Reere*.

The aperture of the shell not being pearly within, and the animal being destitute of eye-peduncles, head- and foot-lobes or filaments, at once distinguishes this genus from *Monodonta*, and removes it from the family *Trochidæ*.

1. **MODULUS LENTICULARIS**, Chemnitz.

Trochus lenticularis, *Chem. Conch.* 5. t. 171. f. 1665.

Trochus modulus, *Linn. Gmel.*

Hab. Mexico. (Mus. Cuming.)

2. **MODULUS TECTUM**, Gmel.

Trochus tectum, *Gmel.* p. 3569. no. 16.

Monodonta retusa, *Lamck. Encyclop.*

Hab. Siquejar, Philippines; *H. C.* (Mus. Cuming.)

3. **MODULUS CARCHEDONICUS**, Lamck.

Monodonta carchedonicus, *Lamck. Hist. An.s. Vert.* tom. vii. p. 33; *Chem. Conch.* 10. t. 165. f. 1583, 1584.

Monodonta Sayii, *Nuttall.*

Hab. Atooi, California; *Nuttall.* (Mus. Cuming.)

4. *MODULUS CIDARIS*, Reeve.

Morulus cidaris, *Reeve, Elements of Conch.* p. 141. pl. 13. f. 63.
Hab. St. Estivan; *H. C.* (Mus. Cuming.)

5. *MODULUS CERODES*, A. Adams. *M. testâ turbinatâ, umbilicatâ, albâ, fusco sparsim inquinatâ, lævigatâ; anfractibus rotundatis, supra planulatis, in medio cingulâ bituberculatâ, infernè cingulis nodulosis ornatis; aperturâ rotundâ; labio purpureo tincto, labro intus lævigato; umbilico profundo, callo columellari subobtecto.*

Hab. ad Fretum Mosambicum. (Mus. Cuming.)

6. *MODULUS DUPLICATUS*, A. Adams. *M. testâ orbiculato-conicâ, umbilicatâ, cærulescenti, fusco variegatâ, spirâ prominulâ, acutâ; anfractibus planulatis, transversim sulcatis, ad peripheriam cingulis duabus tuberculorum compressorum ornatis, tuberculis rufo-fusco maculatis, infimâ fasciâ convexâ, concentricè sulcatâ; aperturâ intus violascenti; labro margine angulato, intus lirato; umbilico mediocri.*

Hab. —? (Mus. Cuming.)

7. *MODULUS OBLIQUUS*, A. Adams. *M. testâ orbiculato-conicâ, perobliquâ, albâ, umbilicatâ, spirâ depressâ; anfractibus subplanulatis, liris transversis, elevatis, supra radiatim nodosoplicatis, ultimo in medio angulato, carinâ prominulâ instructo, infra cingulis transversis elevatis numerosis ornato; aperturâ rotundâ; columellâ roseâ tinctâ; labro intus lirato.*

Hab. Mare Rubrum. (Mus. Cuming.)

EGLISIA CUMINGII, A. Adams. *E. testâ turritâ, solidâ, albâ, longitudinaliter fusco-flammulatâ; anfractibus rotundatis, cingulis acutis, transversis (in anfractu ultimo sex), lineisque elevatis, transversis, interpositis, ornatis, interstitiis longitudinaliter tenuissimè striatis, varicibus tenuibus, longitudinalibus, inæquidistantibus, instructis; aperturâ rotundatâ, peristomate continuo, labio incrassato, anticè producto, calloso, et reflexo; labro simplici, acuto.*

Hab. Japonia. (Mus. Cuming.)

The obscure longitudinal varices show the true position of this genus to be between *Turritella* and *Scalaria*.

4. A MONOGRAPH OF *CYLLENE*, A GENUS OF GASTEROPODOUS MOLLUSCA. BY ARTHUR ADAMS, R.N., F.L.S. ETC.*CYLLENE*, Gray.

Animal unknown. Operculum thin, horny, unguiform, with terminal nucleus and imbricate elements. Shell ovate, volutiform; spire short; suture channeled; aperture oval; columella anteriorly with oblique grooves; outer lip thickened externally, notched in front, grooved within, and subreflected at the margin.

1. CYLLENE LYRATA, Lamarck.

Buccinum lyratum, *Lamk. Hist. An. s. Vert.* tom. vii. p. 272 ; *Kiener, Mon. Bucc.* pl. 22. fig. 88.

2. CYLLENE GRAYI, Reeve.

Cyllene Grayi, *Reeve, Elements of Conch.* pl. 3. fig. 12.

3. CYLLENE OWENII, Gray.

Cyllene Owenii, *Gray, MSS. Brit. Mus.*

4. CYLLENE PULCHELLA, Adams and Reeve.

Cyllene pulchella, *Adams and Reeve, Zool. of Voy. of H.M.S. Samarang*, tab. 10. fig. 11.

5. CYLLENE LUGUBRIS, Adams and Reeve.

Cyllene lugubris, *Adams and Reeve, Zool. Voy. Samarang*, tab. 10. fig. 10.

6. CYLLENE CONCINNA, Soland. *C. testâ ovato-fusiformi; spirâ productâ, albâ, maculis luteo-fuscis ornatâ, longitudinaliter subsulcosâ, transversim totâ striatâ; columellâ anticè obliquè plicatâ; labro extus lævi, incrassato.*

Hab. Guinea.

Buccinum concinnum, Sol.

7. CYLLENE ORIENTALIS, A. Adams. *C. testâ ovato-fusiformi, albidâ, maculis luteo-fuscis ornatâ, longitudinaliter plicatâ, transversim striatâ; spirâ prominulâ; columellâ anticè per-obliquè sulcatâ, labro intus lævi.*

Hab. Singapore, 6 fathoms, mud ; *H. C.* Malacca, 6 fathoms, coarse sand ; *H. C.*

8. CYLLENE STRIATA, A. Adams. *C. testâ ovatâ, albâ, maculis rufo-fuscis ad suturas pictâ, cingulis duabus maculorum luteo-fuscorum ornatâ, longitudinaliter subplicatâ, transversim totâ striatâ; columellâ anticè obliquè sulcatâ; labro tenui, intus lævi, anticè rix sinuato.*

Hab. Albrokkas Islands, under coral, low water ; *Mr. Dring.*

9. CYLLENE FUSCATA, A. Adams. *C. testâ ovatâ, rufo-fusâ, fasciis transversis obscuris articulatis ornatâ, longitudinaliter plicatâ, plicis numerosis, subconfertis, supernè et infernè transversim valdè striatâ; columellâ anticè valdè corrugato-plicatâ, labro anticè valdè sinuato.*

Hab. W. Africa.

10. CYLLENE PALLIDA, A. Adams. *C. testâ ovatâ, albidâ, longitudinaliter subsulcatâ, obscure nodoso-plicatâ, glabrâ, supernè et infernè transversim striatâ; columellâ anticè plicis obliquis, labro anticè valdè sinuato.*

Hab. West Africa.

11. CYLLENE GRANA, Lamarck.

Buccinum grana, *Lamk.; Kiener, Mon.* pl. 16. fig. 58.

12. CYLLENE GLABRATA, A. Adams. *C. testá ovato-fusiformi, glabrátá, cineréá, fasciis albis tribus transversis rufo-articulatis ornatá, longitudinaliter subplicatá, plicis infernè evanidis, supernè et infernè transversim striatá; aperturá angustá; columellá anticè obliquè plicatá, labro anticè subsinuato.*

Hab. Pasicao, 9 fathoms, fine sand; *H. C.*

5. ON THE UMBRELLA BIRD (CEPHALOPTERUS ORNATUS),
"UERAMIMBÉ," L. G. BY ALFRED R. WALLACE. COMMUNICATED BY MR. S. STEVENS.

Having had the opportunity of observing this singular bird in its native country, a few remarks on its characters and habits may not perhaps be uninteresting, at a time when a consignment from me will have arrived in England.

The Umbrella Bird is about the size of a crow, averaging about 18 inches in length. Its colour is entirely black, but varied with metallic blue tints on the outer margin of the feathers. The colour of the iris is greyish white. It is a powerful bird, the bill being very large and strong, the feet short, and the claws acute.

Were it not for its crest and neck plume, it would appear to an ordinary observer nothing more than a short-legged crow.

The crest is perhaps the most fully developed and beautiful of any bird known. It is composed of long slender feathers, rising from a contractile skin on the top of the head. The shafts are white and the plume glossy blue, hair-like, and curved outward at the tip. When the crest is laid back the shafts form a compact white mass, sloping up from the top of the head, and surmounted by the dense hairy plumes. Even in this position it is not an inelegant crest, but it is when it is fully opened that its peculiar character is developed. The shafts then radiate on all sides from the tip of the head, reaching in front beyond and below the top of the beak, which is completely hid from view. The top then forms a perfect, slightly elongated dome, of a beautiful shining blue colour, having a point of divergence rather behind the centre, like that in the human head. The length of this dome from front to back is about 5 inches, the breadth 4 to 4½ inches. The other singular appendage of this bird is the neck plume. This is a long cylindrical plume of feathers depending from the middle of the neck, and either carried close to the breast or puffed out and hanging down in front. The feathers lap over each other, scale-like, and are bordered with fine metallic blue.

On examining the structure of this plume, it is found not to be composed of feathers only, growing from the neck, as seems to have been hitherto supposed. The skin of the neck is very loose; looser and larger, in fact, than in any bird I know of. From the lower part grows a cylindrical fleshy process about as thick as a goose-quill and an inch and a half long. From this grow the feathers to the very point, thus producing the beautiful cylindrical plume quite detached from the breast, and forming an ornament as unique and elegant as the crest itself.

When in motion, either flying or feeding, the crest is laid back and the plume carried close to the breast, so as not to be conspicuous. When at rest in the daytime, the crest is fully expanded, and the plume is rather enlarged and hanging forward. At night, when asleep, all the feathers are puffed out to their fullest extent, and sometimes the head is turned so as to bring the dome of the crest on the middle of the back. It then presents a most singular appearance, the head and feet being quite invisible, the plume and crest alone being conspicuous amidst the mass of feathers.

These observations I was enabled to make by having a fine male alive for ten days. He had received a shot in the head, but appeared to suffer no ill effects from it, till on the tenth day he suddenly fell off his perch and died. I found, on skinning him, that the shot had broken his skull and entered the brain.

The Umbrella Bird inhabits the islands of the rivers, never having been seen on the main land. It is perfectly arboreal, never descending to the ground. Its food is fruit of various kinds, but when this is scarce it eats insects: my hunter saw one with a large hairy spider (*Mygale*) in his mouth. On seizing an insect or fruit, it strikes its beak against its perch several times, apparently to kill or soften it, or secure it more firmly in its beak, and then after two or three bites swallows it entire. Some of the fruits it eats are about the size of a damson, and have a stone, which it ejects through its mouth an hour or two after eating.

Its note is very loud and deep, and it is from this that it has received its Indian name "Ueramimbé," signifying the "Piper-bird." It utters its note early in the morning and in the afternoon. It frequents the very loftiest forest trees, but is said to build its nest rather lower. Its nest is said to be formed of sticks very roughly, and the young are very naked and ugly. The colour or size of the eggs I have not been able to ascertain.

In ascending the Amazon, it first occurs opposite the mouth of the Madeira, in some islands. In the Sohuives, as far as the boundaries of Brazil, it also occurs, and probably further. The Rio Negro, however, is its head-quarters; and there, in the numerous islands which fill that river, it is very abundant. It extends at least four hundred miles up the river, and very probably much further. I have not heard of its occurring in the Rio Branco, Madeira, or any of the other great tributaries of the Amazon. I have been informed by a hunter, that towards the sources of the Rio Negro another species is found, and this I hope soon to have the means of verifying.

Barra do Rio Negro, March 10th, 1850.

The meeting was then adjourned to Tuesday, November 12.

November 12, 1850.

W. Yarrell, Esq., V.P., in the Chair.

Professor Owen read a paper "on the Cranium of the large species of *Dinornis* called *giganteus* and *ingens**." He commenced by referring to a former memoir, in which four generic types of structure had been determined in fossil crania of birds from New Zealand, viz. *Nestor*, *Notornis*, *Palapteryx*, and *Dinornis* proper; and proceeded to describe an additional series of fossil skulls obtained by Governor Sir George Grey from a cave in the district which lies between the river Waikato and Mount Tongariro, in the North Island. The most remarkable of these specimens was an almost entire skull, measuring eight inches in length and five inches across the broadest part of the cranium; which in the extent of the ossified part of the mandible and its downward curvature, resembled the smaller skull described in a former memoir, and there referred to *Dinornis*. In the structure of the occiput and base of the cranium, this large skull more resembled the characters of that ascribed to *Palapteryx*. The indications of the muscular attachments, and the form and size of the massive beak, bespoke the great power and force with which it had been habitually applied in the living bird.

Its anatomical characters were minutely detailed. Comparisons of the area of the occipital foramen for the transmission of the spinal marrow with that of the spinal canal in different vertebræ, were made with a view of determining the species to which the cranium in question might belong; and the peculiar contraction of the spinal canal in the vertebræ of *Dinornis* as compared with that in the Ostrich was pointed out. The inference deduced was, that the cranium, notwithstanding its great size, belonged probably to the species called *Palapteryx ingens*, which was the second in point of size.

A mutilated cranium of a much younger bird, showing all the sutures, but of nearly equal size with the skull first described, might belong to the *Dinornis giganteus*. Two crania, referable to two distinct species of smaller birds of *Palapteryx*, were described, and sections of the cranium were shown, to demonstrate the form and character of the brain. In the collection transmitted by Governor Grey, Professor Owen had, for the first time, recognized a portion of a diminutive wing-bone, similar, in the absence of the usual processes for the muscles of flight, to that in the *Apteryx*, and confirmatory, both by this character and its extreme rarity, contrasted with the abundance of vertebræ and leg-bones that had been transmitted, of the inference as to the rudimental condition of the wings in the *Dinornis* and *Palapteryx*.

The memoir concluded with a description of a cranium of the *Notornis*, more perfect than that fragmentary one on which the affinities

* This paper will appear in the Transactions as *Dinornis*, Part V., in continuation of Prof. Owen's previous memoirs.

of that bird to the *Rallidæ* or Coot-tribe had originally been founded, and its generic distinction from *Porphyrio* established. The specimen exhibited confirmed the accuracy of the conjectural restorations in the figure of the original specimen in a former volume of the Transactions of the Society.

The following papers were also read :—

1. NOTICE OF THE DISCOVERY BY MR. WALTER MANTELL IN THE MIDDLE ISLAND OF NEW ZEALAND, OF A LIVING SPECIMEN OF THE NOTORNIS, A BIRD OF THE RAIL FAMILY, ALLIED TO BRACHYPTERYX, AND HITHERTO UNKNOWN TO NATURALISTS EXCEPT IN A FOSSIL STATE. BY GIDEON ALGERNON MANTELL, ESQ., LL.D., F.R.S. ETC.

Amongst the fossil bones of birds collected by my eldest son in the North Island of New Zealand, which I had the honour of placing before the Zoological Society in 1848, in illustration of Professor Owen's description of the crania and mandibles of *Dinornis*, *Palapteryx*, &c., there were the skull, beaks, humerus, sternum, and other parts of the skeleton of a large bird of the Rail family, which from their peculiar characters were referred by that eminent anatomist to a distinct genus of *Rallidæ* allied to the *Brachypteryx*, under the name of *Notornis* * ; a provision, the correctness of which is confirmed by the recent specimen that forms the subject of the present communication.

Towards the close of last year I received from Mr. Walter Mantell another extensive and highly interesting collection of fossils, minerals, and rock specimens, obtained during his journey along the eastern coast of the Middle Island, from Banks' Peninsula to the south of Otago, in the capacity of Government Commissioner for the settlement of native claims. This series comprised also a fine suite of birds' bones from Waingongoro, the locality whence the former collection was chiefly obtained, and among them were relics of the *Notornis*, and crania and mandibles of *Palapteryx*.

The results of my son's observations on the geological phænomena presented by the eastern coast of the Middle Island are embodied in a paper read before the Geological Society in February last, and published in vol. v. of the 'Quarterly Journal.' It will suffice for my present purpose to mention that they confirm in every essential particular the account given of the position and age of the ornithic ossiferous deposits, in my first memoir on this subject †.

The only fact that relates to the present notice is the nature of the bone-bed at Waikonaiti, whence Mr. Percy Earl, Dr. Mackellar, and other naturalists procured the first relics of the gigantic birds, sent by those gentlemen to England, which are figured and described in the 'Zoological Transactions.'

This so-called tertiary deposit is situated in a little bay south of Island Point, near the embouchure of the river Waikonaiti, and is

* Zoological Transactions, vol. iii. p. 366. † Geological Journal, vol. iv.

only visible at low-water, when bones more or less perfect are occasionally observable projecting from the waterworn surface of the bog. This deposit is about 3 feet in depth and not more than 100 yards in length; the extent inland is concealed by vegetation and a covering of superficial detritus, and is supposed to be very inconsiderable. This bed rests upon a blue tertiary clay that emerges here and there along that part of the coast, and which abounds in shells and corals, of species existing in the adjacent sea.

This bone deposit was evidently a morass or swamp, on which the New Zealand flax (*Phormium tenax*) once grew luxuriantly. Bones of the larger species of Moa have from time to time been obtained from this spot by the natives and European visitors; and, as in the menaccanite sand beds at Waingongoro, they are associated with bones of one species of dog and two species of seal: my son also collected crania and other remains of a species of *Apteryx* (probably *Ap. Australis*), Albatros, Penguin, and of some smaller birds whose characters and relations have not yet been ascertained: no bones of the *Notornis* were observed in this locality.

It was from this ancient morass that my son obtained the entire series of bones composing the pair of feet of the same individual *Di-nornis robustus*, standing erect, the one about a yard in advance of the other, as if the unfortunate bird had sunk in the slough, and unable to extricate itself had perished on the spot. The upper or proximal ends of the tarso-metatarsals were alone visible above the sod on the retreating of the tide; these were carefully dug round, and the phalanges exposed in their natural order and connection: the bones were numbered as they were extracted from the soil, and thus the normal elements of the locomotive organs of one of the colossal struthious bipeds of New Zealand were for the first time determined*.

It was in the course of last year, on the occasion of my son's second visit to the south of the Middle Island, that he had the good fortune to secure the recent *Notornis* which I have now the pleasure of submitting to this Society, having previously placed it in the hands of the eminent ornithologist Mr. Gould to figure and describe, as a tribute of respect for his indefatigable labours in this department of Natural History.

This bird was taken by some sealers who were pursuing their avocations in Dusky Bay. Perceiving the trail of a large and unknown bird on the snow with which the ground was then covered, they followed the foot-prints till they obtained a sight of the *Notornis*, which their dogs instantly pursued, and after a long chase caught alive in the gully of a sound behind Resolution Island. It ran with great speed, and upon being captured uttered loud screams, and fought and struggled violently; it was kept alive three or four days on board the schooner and then killed, and the body roasted and ate by the crew, each partaking of the dainty, which was declared to be delicious. The beak and legs were of a bright red colour. My son

* The principal dimensions of these bones are given in the Quarterly Journal of the Geological Society, vol. vi. p. 338; and figures with descriptions in 'The Pictorial Atlas of Organic Remains,' just published.

secured the skin, together with very fine specimens of the Kakapo or Ground Parrot (*Strigops*), a pair of Huia's (*Neomorpha*), and two species of Kiwi-kiwi, namely *Apteryx Australis* and *Ap. Oweni*; the latter very rare bird is now added to the collection of the British Museum.

Mr. Walter Mantell states, that, according to the native traditions, a large Rail was contemporary with the Moa, and formed a principal article of food among their ancestors. It was known to the North Islanders by the name of "*Moho*," and to the South Islanders by that of "*Takahé*;" but the bird was considered by both natives and Europeans to have been long since exterminated by the wild cats and dogs, not an individual having been seen or heard of since the arrival of the English colonists. That intelligent observer, the Rev. Richard Taylor, who has so long resided in the islands, had never heard of a bird of this kind having been seen. In his '*Leaf from the Natural History of New Zealand* *,' under the head of "*Moho*," is the following note: "RAIL, colour black, said to be a wingless bird as large as a fowl, having a long bill and red beaks and legs; it is nearly exterminated by the cat: its cry was 'keo, keo.'" The inaccuracy and vagueness of this description prove it to be from native report and not from actual observation. To the natives of the paha or villages on the homeward route, and at Wellington, the bird was a perfect novelty and excited much interest. I may add, that upon comparing the head of the bird with the fossil cranium and mandibles, and the figures and descriptions in the '*Zoological Transactions*' (pl. 56), my son was at once convinced of their identity; and so delighted was he by the discovery of a living example of one of the supposed extinct contemporaries of the Moa, that he immediately wrote to me, and mentioned that the skull and beaks were alike in the recent and fossil specimens, and that the abbreviated and feeble development of the wings, both in their bones and plumage, were in perfect accordance with the indications afforded by the fossil humerus and sternum found by him at Waingongoro, and now in the British Museum, as pointed out by Professor Owen in the memoir above referred to.

It may not be irrelevant to add, that in the course of Mr. Walter Mantell's journey from Banks' Peninsula along the coast to Otago, he learnt from the natives that they believed there still existed in that country the only indigenous terrestrial quadruped, except a species of rat, which there are any reasonable grounds for concluding New Zealand ever possessed. While encamping at Arowenua in the district of Timaru, the Maoris assured him that about ten miles inland there was a quadruped which they called Káurêke, and that it was formerly abundant, and often kept by their ancestors in a domestic state as a pet animal. It was described as about two feet in length, with coarse grisly hair; and must have more nearly resembled the Otter or Badger than the Beaver or the Ornithorhynchus, which the first accounts seemed to suggest as the probable type. The offer of a liberal reward induced some of the Maoris to start for the interior of the country where the Káurêke was supposed to be located, but

* Published at Wellington, 1848.

they returned without having obtained the slightest trace of the existence of such an animal ; my son, however, expresses his belief in the native accounts, and that if the creature no longer exists, its extermination is of very recent date.

In concluding this brief narrative of the discovery of a living example of a genus of birds once contemporary with the colossal Moa, and hitherto only known by its fossil remains, I beg to remark, that this highly interesting fact tends to confirm the conclusions expressed in my communications to the Geological Society, namely, that the *Dinornis*, *Palapteryx*, and related forms, were coeval with some of the existing species of birds peculiar to New Zealand, and that their final extinction took place at no very distant period, and long after the advent of the aboriginal Maoris. As my son at the date of his last letter was about to depart on another exploration of the bone deposits of the North Island, I indulge the hope that he will ere long have the gratification of transmitting or bringing to England additional materials for the elucidation of the extinct and recent faunas of New Zealand.

With much pleasure I resign to Mr. Gould the description of the ornithological characters and relations of this, in every sense, *rara avis*, from the Isles of the Antipodes.

Chester Square, Pimlico, November 1, 1850.

2. REMARKS ON NOTORNIS MANTELLI. BY J. GOULD, F.R.S.

(Aves, Pl. XXI.)

Dr. Mantell having kindly placed his son's valuable acquisition in my hands for the purpose of characterizing it in the Proceedings of the Society, and of afterwards figuring and describing it in the appendix to my work on the 'Birds of Australia,' I beg leave to commence the pleasing task he has assigned to me.

The amount of interest which attaches to the present remarkable bird is perhaps greater than that which pertains to any other with which I am acquainted, inasmuch as it is one of the few remaining species of those singular forms which inhabited that supposed remnant of a former continent—New Zealand, and which have been so ably and so learnedly described, from their semi-fossilized remains, by Professor Owen ; who, as well as the scientific world in general, cannot fail to be highly gratified by the discovery of a recent example of a form previously known to us solely from a few osteological fragments, and which, but for this fortunate discovery, would in all probability, like the Dodo, have shortly become all but traditional. While we congratulate ourselves upon the preservation of the skin, we must all deeply regret the loss of the bones, any one of which would have been in the highest degree valuable for the sake of comparison with the numerous remains which have been sent home from New Zealand.

Upon a cursory view of this bird it might be mistaken for a gigantic kind of *Porphyrio*, but on an examination of its structure it will be



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NOTORNIS MANTELLI Owen

Plate 1. 1846.

found to be generically distinct. It is allied to *Porphyrio* in the form of its bill and in its general colouring, and to *Tribonyx* in the structure of its feet, while in the feebleness of its wings and the structure of its tail it differs from both.

From personal observation of the habits of *Tribonyx* and *Porphyrio*, I may venture to affirm that the habits and æconomy of the present bird more closely resemble those of the former than those of the latter; that it is doubtless of a recluse and extremely shy disposition; that being deprived, by the feeble structure of its wing, of the power of flight, it is compelled to depend upon its swiftness of foot for the means of evading its natural enemies; and that, as is the case with *Tribonyx*, a person may be in its vicinity for weeks without ever catching a glimpse of it.

From the thickness of its plumage and the great length of its back-feathers, we may infer that it affects low and humid situations, marshes, the banks of rivers, and the coverts of dripping ferns, so abundant in its native country: like *Porphyrio*, it doubtless enjoys the power of swimming, but would seem, from the structure of its legs, to be more terrestrial in its habits than the members of that genus.

I have carefully compared the bill of this example with that figured by Professor Owen under the name of *Notornis Mantelli*, and have little doubt that they are referable to one and the same species; and as we are now in possession of materials whence to obtain complete generic characters, I hasten to give the following details, in addition to those supplied by Professor Owen.

Bill somewhat shorter than the head; greatly compressed on the sides, both mandibles being much deeper than broad; tomia sharp, curving downwards, inclining inwards and slightly serrated; culmen elevated, much arched and rising on the forehead to a line with the posterior angle of the eye; *nostrils* round, and placed in a depression near the base of the bill; wings very short, rounded, and slightly concave; primaries soft and yielding; the first short; third, fourth, fifth, sixth and seventh equal and the longest; tail-feathers soft, yielding, and loose in texture; tarsi powerful, longer than the toes, almost cylindrical; very broad anteriorly; defended in front and on either side posteriorly by broad and distinct scutellæ; the spaces between the scutellæ reticulated; anterior toes large and strong, armed with powerful hooked nails, and strongly scutellated on their upper surface; hind-toe short, strong, placed somewhat high on the tarsus, and armed with a blunt hooked nail.

Head, neck, breast, upper part of the abdomen and flanks purplish blue; back, rump, upper tail-coverts, lesser wing-coverts and tertiaries dark olive-green, tipped with verditer-green; at the nape of the neck a band of rich blue separating the purplish blue of the neck from the green of the body; wings rich deep blue, the greater coverts tipped with verditer-green, forming crescentic bands when the wing is expanded; tail dark green; lower part of the abdomen, vent and thighs dull bluish black; under tail-coverts white; bill and feet red.

Total length of the body, 26 inches; bill, from the gape to the

tip, $2\frac{1}{4}$; from the tip to the posterior edge of the plate on the forehead, 3; wing, $8\frac{1}{2}$; tail, $3\frac{1}{2}$; tarsi, $3\frac{1}{2}$; middle toe, 3; nail, $\frac{1}{4}$; hind-toe, $\frac{1}{4}$; nail, $\frac{3}{4}$.

I cannot conclude these remarks without bearing testimony to the very great importance of the results which have attended the researches of Mr. Walter Mantell in the various departments of science to which he has turned the attention of his cultivated, intelligent and inquiring mind, nor without expressing a hope that he may yet be enabled to obtain some particulars as to the history of this and the other remarkable birds of the country in which he is resident.

November 26, 1850.

R. H. Solly, Esq., F.R.S., in the Chair.

The following papers were read:—

1. LIST OF BIRDS PROCURED IN KORDOFAN BY MR. J. PETHERICK. WITH NOTES BY H. E. STRICKLAND, M.A., F.G.S.

(Aves, Pl. XXII. XXIII. XXIV.)

[Species not enumerated in Rüppell's 'Systematische Uebersicht der Vögel Nord-Ost-Afrika's,' 8vo, Frankfurt a. M. 1845, are marked N.

Species common to the West Coast of Africa are marked W. These are chiefly determined by reference to Dr. Hartlaub's valuable list of West African birds in the 'Verzeichniss der öffentlichen u. Privat-Vorlesungen am Hamburgischen Gymnasium,' 4to, Hamburg, 1850.]

1. *Neophron percnopterus*.

2. *Fultur occipitalis*.

3. *Otogyps auricularis*.

4. *BUTEO RUFIPENNIS*, Strickland, n. s. Upper parts cinereo-fuscous, nearly black on the crown; feathers of back and wing-covers with black shafts; cheeks cinereous, a black line below them from angle of mouth; chin whitish, with a medial dark streak; breast and sides ferruginous brown, with a conspicuous medial black streak one-sixteenth of an inch wide on each feather; belly, thighs and vent plain fulvous; primaries and secondaries bright ferruginous, tipped for about an inch and a half with black, and from three to five distant transverse black bands on the inner web; tail cinereo-fuscous, with five dark fuscous bands, each about a quarter of an inch wide, the distal one about half an inch, beyond which the extremity is cinereo-fuscous and the extreme tip white; cere and legs yellowish; beak and claws black.

Length 17 inches; wing, $12\frac{1}{4}$; medial rectrices, $7\frac{1}{2}$; external ditto, $7\frac{1}{4}$; tarsus, $2\frac{1}{4}$.

Hab. Kordofan. (Aves, Pl. XXII.)



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BUTEO RUFIPENNIS Strickl

5. *Aquila naxia*.

6. *Aquila pennata*.

7. *W. Circaëtus brachydactylus*.

8. *Helotarsus ecaudatus*.

9. *Falco biarmicus*, Temm. (*F. peregrinoides*, Temm.; *F. chi-queroides*, Smith; *F. feldeggii*, Schlegel; *F. lanarius*, Schlegel; *F. rubeus*, Thienemann; *F. cervicalis*, Kaup.)

After a careful examination of many specimens, I feel justified in uniting the above synonyms under one species. This is essentially an African bird, extending from the Cape of Good Hope to Egypt, whence it has probably spread into Greece and Dalmatia, to which portions of Europe it is chiefly confined, though a single straggler has occurred in Germany. It is at once distinguished from *F. peregrinus* by the shorter toes, and the fulvous patch on the crown. The *Falco jugger*, Gray (*F. luggur*, Jerdon), of India is closely allied, but seems to differ constantly in the plumes of the tibia being uniformly dark brown, while in *F. biarmicus* they are cream-coloured or white, like the rest of the under parts, with a small brown spot on the centre of each feather. This is one of the many species to which the name *Falco lanarius* has been given, under the supposition that it may be the *Lanner* of the old works on falconry; but as the original *F. lanarius* of Linnaeus is now admitted to be the young of *F. gyrfalco*, and as systematists are generally agreed not to trace binomial titles further back than Linnaeus's *Systema*, of course the specific name *lanarius* must be dropped altogether, and the oldest binomial name, *Falco biarmicus*, Temm., adopted for the present species.

10. *W. Tinnunculus alaudarius* (Gm.). This widely diffused species extends, without variation of form or colour, from Britain southwards to Central Africa and eastwards to India.

11. *N. W. Nauclerus riocouri*, Vieill.

12. *Accipiter sphenurus*, juv.? Resembles *A. sphenurus*, Rüpp., in the cuneate form of the tail. Head and neck rufescent, with a fuscous medial stripe on each feather; belly white, barred with brown; back cinereous brown with rufous margins; *upper tail-covers white*; tail cinereous, with three broad fuscous bars, outer feather white, with five bars.

13. *N. Accipiter carbonarius* (Licht.). Two specimens agree with Lichtenstein's description (in his *Verzeichniss einer Sammlung von Säugethieren u. Vögeln aus dem Kafferlande*, 8vo, Berlin, 1842, p. 11), except in having only *three or four* white bands on the tail instead of *five*. With the exception of these bands, and the numerous light and dark brown bands on the remiges, the plumage is wholly black; cere and legs yellow.

Total length, 12 inches; wing, 7; tarsus, $1\frac{6}{10}$.

14. *W. Melierax gabar* (Daud.). (*Accipiter erythrorhynchus*, Sw.)

15. *Melierax polyzonus*, Rüpp. United by Mr. Gray to *M. canorus*, Rislach (*M. musicus*, Daud.), but differs in its smaller size, and in having the upper tail-covers banded grey and white, while in *M. cu-*

norus they are pure white. The wing in *M. polyzonus* measures 12 inches, in *M. canorus*, 15 inches.

16. *W. Polyboroides radiatus* (Scop.). (*Falco gymnogenys*, Temm.)

17. *N. Circus pallidus*, Sykes.

18. *W. Scops leucotis* (Temm.).

19. *W. Scotornis climacurus* (Vieill.).

20. *Caprimulgus infuscatus*, Cretzschm., female. Agrees with Rüppell's plate, but wants the white wing- and tail-spots of the male bird.

21. *W. Eurystomus afer* (Lath.). (*E. orientalis*, Rüpp.; *E. rubescens*, Vieill.; *Collaris purpurascens*, Wagl.)

22. *W. Coracias abyssinica*, Gm. (*Coracias caudata*, Wagl.)

23. *W. Coracias nœvia*, Daud. (*C. levaillanti*, Rüpp.; *C. nuchalis*, Swains.)

24. *W. Ceryle rudis* (Linn.). (*Ispida bicincta*, Swains.; *I. bitorquata*, Swains.) Identical with specimens from Smyrna and S. Europe. The individuals with two pectoral bands (*I. bicincta*, Swains.) are the males.

25. *N. W. Merops albicollis*, Vieill. (*M. curieri*, Licht.; *M. savignyi*, Swains.)

26. *W. Merops nubicus*, Gm. (*M. superbus*, Shaw; *M. cæruleocephalus*, Lath.)

27. *W. Merops lamarecki*, Cuv. (*M. viridissimus*, Sw.; *M. ægyptius*, Kittlitz; *M. viridis*, Rüpp.) Closely allied to *M. viridis*, Linn., of India, but smaller, with a larger mixture of golden yellow in the plumage, the throat not blue as in *M. viridis*, and the remiges are rufous on both webs, with scarcely any tinge of green externally.

28. *W. Merops erythropterus*, Gm. (*M. minutus*, Cuv.; *M. collaris*, Vieill.; *M. lafresnayei*, Guérin.)

29. *Irrisor senegalensis* (Vieill.)? The Kordofan specimens agree, in the shortness and nearly straight form of their beak, with the black-beaked species of W. Africa, *I. senegalensis*, Vieill. (*Nectarinia melanorhynchus*, Licht.), but in the red colour of this organ they agree with the Cape species (*I. erythrorhynchus*). It is well known that the females of the latter have the beak much shorter and straighter than the males, yet in these Kordofan specimens the beak, though of the same length, is considerably straighter than in the female birds from the Cape. Like *I. senegalensis* they have a broad white bar crossing the inner webs of the first three, and both webs, shaft included, of the remaining primaries; while in *I. erythrorhynchus* the white bar of the primaries is much narrower, and divided by the black shaft.

30. *Nectarinia metallica*, Ehrenb.

31. *W. Nectarinia pulchella* (Linn.).

32. *Phylloscopus trochilus* (Linn.). Identical with British specimens.

33. *Saxicola deserti*, Temm.

34. *Saxicola ananthe* (Linn.).

35. *Saxicola isabellina*, Cretzschm. This is probably the *Sylvia*

leucorrhœa, Gm., in which case it extends to Senegal. It resembles *S. ænanthe*, but is paler on the upper part, and has less white on the lateral rectrices, the terminal black portion being $1\frac{1}{6}$ inch in length, while in *S. ænanthe* it is only about $\frac{3}{4}$ inch.

36. *Motacilla capensis*, Linn.

37. *Budytes melanocephala* (Licht.).

38. *Anthus* (undetermined species).

39. W. *Melanornis*? *erythropterus* (Gm.). (*Turdus erythropterus*, Gm.) This bird approaches nearly to the type of *Melanornis*, Gray (*Melasoma*, Sw.), though the beak is rather more elongated, and the rectal bristles less developed, than in *M. edolioides*, Sw. Rüppell refers it to Boie's genus *Cercotrichas*, which is synonymous with *Copsychus*, Wagl. Dr. Hartlaub places it in *Argya*, Lesson, which is synonymous with *Chætops*, Sw.

40. W. *Pycnonotus barbatus* (Desfontaines). (*Turdus barbatus*, Desfont. in Mém. Ac. Sc. 1787; *Turdus arsinœ*, Licht.; *Ixos obscurus*, Temm.; *I. inornatus*, Fraser; *Hæmatornis lugubris*, Less.)

41. *Oriolus galbula*, Linn.

42. W. *Dicrurus dicaricatus*, Licht. (*D. lugubris*, Ehrenb.; *D. canipennis*, Swains.) Nearly allied to the *D. musicus*, Vieill., of S. Africa, but has the tail less deeply forked, the culmen of the beak more acute, and the primaries pale internally.

43. *Lanius algeriensis*, Less. in Rev. Zool. 1839. This is probably the species termed *L. excubitor* by Rüppell. It differs from the true *excubitor* of N. Europe in the greater extent of white on the primaries, and in the two external pairs of rectrices being wholly white (except the shafts). It closely approaches *L. lahtora* of India, and only differs in wanting the narrow band of black across the front.

44. *Lanius nubicus*, Licht. (*L. personatus*, Temm.)

45. *Lanius collurio*, Linn. A young male specimen appears referable to this species.

46. N. *Lanius isabellinus*, Ehrenberg, Symb. Phys. fol. e. This species is pale fulvo-cinereous above, cream-coloured below; rump and tail rufous; a broad blackish band from the nostril to the ear-covers, margined above by a whitish streak. It much resembles *L. arenaarius*, Blyth, Journ. As. Soc. Beng. vol. xv. p. 304, but is of a more cinereous tinge above, and is distinguished from that and all the allied Asiatic species by possessing a conspicuous white band at the base of the fourth to the ninth primaries. The specimen from Kordofan has an obscure dark transverse band near the tips of the rectrices.

47. W. *Telophonus senegalus* (Linn.). (*Lanius erythropterus*, Shaw.)

48. W. *Corvus scapulatus*, Daud. (*C. leuconotus*, Sw.)

49. *Corvus umbrinus*, Sundevall. Distinguished by the length and curvature of the beak, and by the grey-brown tint of the head and neck.

50. W. *Juida rufiventris*, Rüpp.

51. W. *Juida chalybea*, Ehrenb. (*Lamprotornis cyanotis*, Sw.)

52. W. *Ploceus luteolus*, Licht. (*P. personatus*, Vieill., Jard. Contrib. to Ornith. 1849, p. 35. pl. 7.)

53. *W. Ploceus sanguinirostris* (Linn.).

54. *W. Pyromelana ignicolor* (Vieill.).

55. *W. Vidua paradisea* (Linn.). The series of immature specimens in the collection have enabled me to detect a curious structure connected with the development of the tail-feathers, which will be treated of in a separate paper. See Sir W. Jardine's 'Contributions to Ornithology,' 1850, p. 88. pl. 59.

56. *W. Phileterus principalis* (Linn.). The specimen from Kordofan, like those from Senegal, has a black spot on the chin, but it is not yet proved whether the presence of this spot amounts to a specific distinction.

57. *W. Pytelia elegans* (Gm.).

58. *W. Amadina fuscata* (Gm.). (*Fringilla detruncata*, Licht.)

59. *W. Amadina cantans* (Gm.). A perfectly typical *Amadina*, though M. Rüppell makes it an *Estrilda*.

60. *W. Phileterus nitens* (Gm.). (*Amadina nitens*, Sw.) From the peculiar form of the beak I am disposed to refer this species, as well as *Estrilda squamifrons*, Smith, *E. musica*, Gray, and *Loxia frontalis*, Daud., to the genus *Phileterus*.

61. *Crithagra lutea* (Licht.), Temm. Pl. Col. 365.

62. *W. Passer simplex*, Licht. (*Pyrgita swainsoni*, Rüpp.)

63. *Emberiza striolata*, Rüpp.

64. *Galerida cristata* (Linn.)? This is probably the bird so designated by Rüppell, who states it to be abundant in the whole of N. Africa. It precisely agrees with European specimens in form, but is of a much paler colour, which however may be easily explained by the bleaching effect of the sun's rays in the scorching deserts which this bird frequents.

65. *N. MIRAFRA CORDOFANICA*, Strickland, n. s. Above ferruginous, the feathers of the crown and back with an indistinct medial dusky streak, and margined on their inner side with rusty white; tertials broadly margined with whitish, that colour being separated from the ferruginous of the medial portion by a narrow dusky line; secondaries ferruginous, margined externally with whitish; primaries ferruginous at the base, their distal half being pale rufo-fuscous; medial pair of rectrices ferruginous, the next pair pale rufo-fuscous, the two following pairs deep fuscous, with a very narrow rufescent margin, the penultimate pair deep fuscous internally; the external web, and part of the inner at the tip, white; external pair white, the inner web fuscous towards the base; cheeks pale rufo-fuscous, chin and throat white, breast and lower parts pale cream-colour, the former with a few pale rufo-fuscous subtriangular spots; lower wing-covers and sides rufescent; beak, feet and claws pale yellowish. (Aves, Pl. XXIII.)

Total length, $5\frac{1}{4}$ inches; beak to front, $\frac{1}{4}$, to gape, $\frac{6}{10}$; wing, $3\frac{3}{10}$; medial and external rectrices, $2\frac{7}{10}$; tarsus, $\frac{9}{10}$; middle toe and claw, $\frac{7}{10}$; hind toe, $\frac{3}{10}$; hind claw, $\frac{3}{10}$.

This, which seems to be a typical *Mirafra*, is remarkable for the predominance of a pure ferruginous tint on its upper parts. The hind



SPARROW, COPPERFIELD, S. 1891



Illustration by J. H. J.

STAMPED BY THE BUREAU OF THE

claw is remarkably short, though not more so than in some of the Indian species of *Mirafra*. The single specimen that occurred of this bird is now in the British Museum.

66. *ALAUDA ERYTHROPYGIA*, Strickland, n. s. Upper parts deep fuscous brown, the feathers narrowly margined with rufo-fulvous; upper tail-coverts ferruginous; remiges deep fuscous, almost black on both webs, secondaries narrowly tipped with pale fulvous; tail fuscous black, the middle rectrices narrowly margined with ferruginous, the bases of all ferruginous, extending obliquely nearly to the tips of the outer pair. Lower parts pale fulvous, the chin, throat and breast with a broad medial fuscous streak on each feather; lower wing-coverts black, margins of wing fulvous; beak fuscous; legs flesh-colour; hind claw short and slightly curved. (Aves, Pl. XXIV.)

Length $7\frac{1}{2}$ inches; beak to front, $\frac{6}{16}$, to gape, $\frac{1\frac{1}{2}}{16}$; wing, $4\frac{1}{4}$; medial and external rectrices, 3; tarsus, 1; hind claw, $\frac{3}{16}$.

Hab. Kordofan.

67. *W. Colius macrurus*, Linn. (*C. senegalensis*, Gm.)

68. *W. Tockus erythrorhynchus* (Kuhl).

69. *W. Paleornis torquatus*, Vig. (*P. cubicularis*, Wagl.) This species, which extends across Africa from Abyssinia to Senegal, is identical with specimens from India.

70. *W. Pogonius vieilloti*, Leach. (*P. senegalensis*, Licht.; *P. rubescens*, Temm.) N.B. This generic name was originally written *Pogonia* by Leach (Zool. Misc. vol. ii. p. 45), in which form it had been preoccupied by a genus of plants. Illiger's name, *Pogonias*, had also been preoccupied by a fish-genus; but Leach afterwards corrected it to *Pogonius*, which form had never been used before, and I therefore retain it instead of Mr. G. R. Gray's name *Læmodon* (erroneously written *Laimodon*).

71. *Trachyphonus margaritatus*, Rüpp. (*Tamatia erythropyga*, Ehrenb.)

72. *Yunx torquilla*, Linn. Identical with specimens from Britain and from India.

73. *N. Oxylophus serratus* (Sparrm.). This Cape bird has never before, I believe, been obtained to the north of the equator. The nearly allied *O. jacobinus* (Bodd.) of India (*Cuculus melanoleucus*, Gm.; *C. passerinus*, Vahl) has the lower parts constantly white. Ehrenberg, in his 'Symbolæ Physicæ,' fol. r, describes a Nubian species under the name of *Cuculus pica*, which from the description seems to be identical with the white-bellied *O. jacobinus* of India. Rüppell erroneously refers this *C. pica* of Ehrenberg to the *Oxylophus afer*, Leach (Levaill. Ois. Afr. pl. 209), of S. Africa, which differs in having dark streaks on the throat, and which appears from Rüppell's observations to be also an Abyssinian bird.

74. *W. Oxylophus glandarius* (Linn.).

75. *W. Columba guinea*, Linn. (*C. trigonigera*, Wagl.)

76. *Numida ptilorhyncha*, Licht.

77. *Francolinus clappertoni*, Vig. Mr. G. R. Gray has separated the *F. clappertoni* of Rüppell as a distinct species, under the name of

F. rüppelli; but the specimens from Kordofan seem to agree equally well with Rüppell's plate of *F. rüppelli* and with Gray's plate of what he regards as the true *clappertoni*, between which I can see no difference.

78. *Coturnix dactylisonans*.

79. N. W. *Pterocles quadricinctus*, Temm. (*P. tricinatus*, Sw.) This African species has long been confounded with the closely allied *P. fasciatus* (Scop.), (*Perdix indica*, Lath.), of India, figured by Mr. Jerdon in his 'Illustrations of Indian Ornithology,' pl. 10 and 36. Specimens sent by Mr. Jerdon have now enabled me to prove their distinction. The general arrangement of colour is almost identical in these two species, the chief distinction being in the feathers of the back, scapulars, tertials and greater wing-covers, which in *P. fasciatus* are marked transversely with bars of a dull iron-grey (or "inky hue," as Mr. Jerdon well describes it), while in *P. tricinatus* these bands are of a deep glossy black. In *P. fasciatus* the wing-covers next the body have two or three of these dark bands alternating with white ones of equal breadth, the subterminal one being dark, and the tip of the feather ochreous yellow. In *P. quadricinctus* the wing-covers have only one black band, (or a very faint trace of a second,) narrowly margined on both sides with a fine white line, the terminal and basal parts of the feather being ochreous. Temminck's original description of *P. quadricinctus* is evidently taken from the African bird, but he erroneously gives India as its habitat, in consequence of having confounded it with *P. fasciata*. Vieillot has increased the confusion by figuring the *quadricinctus* in his 'Galerie des Oiseaux,' pl. 220, under the specific name of *bicinatus*, while his description refers to the true *P. bicinctus*, Temm., a S. African bird.

80. W. *Otis rhaad*, Gm.

81. N. W. *Eupodotis denhami* (Vig.).

82. W. *Ortyxelos meiffreni*, Vieill.

83. W. *Ædicnemus crepitans*, Linn. This seems to me to be undistinguishable from *Æ. senegalensis* (Swains. Birds W. Afr. vol. ii. p. 228), the description of which agrees with the European bird.

84. *Ædicnemus affinis*, Rüpp. So exactly does this agree in size and form with *Æ. crepitans*, that I should have suspected it to be an immature bird, did not M. Rüppell appear so convinced of its distinctness.

85. *Pluvianus ægyptius* (Linn.).

86. *Glareola limbata*, Rüpp. Closely resembles *G. orientalis* of India, but has the external rectrices about an inch longer.

87. N. W. *Squatarola helvetica* (Linn.).

88. N. W. *Rhinoptilus chalcopterus* (Temm.). (*Cursorius chalcopterus*, Temm.) This, with the nearly allied *M. bitorquatus*, Blyth, of India, form a very distinct group, connecting *Cursorius* with *Charadrius*. Mr. Blyth first formed it into a genus, under the name of *Macrotarsus* (Journ. Asiat. Soc. Beng. vol. xvii. part 1. p. 254); but as the name has been previously used by Lacépède for genera of mammals and of birds, and by Schönherr for a coleopterous insect, I

propose the name *Rhinoptilus*, indicating the advanced position of the frontal feathers, which, with other characters, distinguish it from *Charadrius*.

89. N. *Chætusia gregaria* (Pall.).

90. W. *Lobivanellus albicapillus* (Vieill.). (*Fanellus strigilatus*, Swains.)

91. W. *Hoplopterus persicus* (Bonn.). (*H. spinosus*, auct. recentiorum.)

92. W. *Sarciophorus pileatus* (Gm.).

93. *Charadrius hiaticula*, Linn.

94. *Charadrius alexandrinus*, Linn. (*C. cantianus*, Lath.)

95. *Charadrius pecuarius*, Licht.

96. W. *Ardeola coromanda* (Bodd.). (*Ardea coromandelensis*, Kuhl; *A. coromandelica*, Licht.; *A. affinis*, Horsf.; *A. russata*, Temm.; *A. bicolor*, Vieill.; *A. ruficapilla*, Vieill.; *A. bubulcus*, Audouin; *A. caboga*, Franklin; *A. verrani*, Roux; *A. lucida*, Raff.; *Leptorodas ibis*, Ehrenb.) I could have wished that M. Rüppell had given us the diagnoses of *A. bubulcus* and *coromandelica* when he pronounced them distinct. As far as my own comparisons extend, the African and Indian birds are specifically the same.

97. *Botaurus stellaris* (Linn.).

98. *Grus cinereus*.

99. W. *Ciconia alba*.

100. *Ibis æthiopica*.

101. W. *Glottis canescens* (Gm.). (*G. chloropus*, Nilss.)

102. W. *Totanus hypoleucus* (Linn.).

103. W. *Pelidna minuta*, Leisl.

104. W. *Pelidna subarquata* (Gm.).

105. *Machetes pugnax* (Linn.).

106. *Crex pratensis*, Bechst.

107. W. *Sarkidiornis africana*, Eyton.

108. *Chenalopex ægyptiacus*.

109. W. *Dendrocygna viduata* (Linn.). We have the authority of Jacquin, Azara, and other authors, for the occurrence of this bird in S. America. If this be the case, it will form the *only known instance* of a non-marine bird being indigenous to both the African and South American continents, without occurring in Europe, Asia, or North America. Before, however, admitting this remarkable exception to the laws of geographical distribution, the absolute specific identity of the African and American specimens should be established by careful comparison, which, as far as I am aware, has not yet been done.

110. *Sterna anglica*, Mont.

111. *Hydrochelidon nigra* (Linn.).

112. W. *Pelecanus rufescens*.

2. SYNOPSIS OF THE SPECIES OF DEER (CERVINA), WITH THE DESCRIPTION OF A NEW SPECIES IN THE GARDENS OF THE SOCIETY. BY J. E. GRAY, ESQ., F.R.S. ETC.

(Mammalia, Pl. XXII.—XXVIII.)

The Deer, spread over all parts of the Globe, are easily recognized by their deciduous horns, which are covered, when they are first developed, with a hairy skin.

It has been supposed that the Deer were not to be found in Africa, but the discovery of a species in Barbary has dispelled that idea; they are rare in that extensive quarter of the world, their place being supplied by Antelopes.

Since the publication of Cuvier's Essay on Deer, in which he described several species from the study of the horns alone, many zoologists have almost entirely depended on the horns for the character of the species, and Colonel Hamilton Smith has been induced to separate some species on the study of a single horn. But the facilities which menageries have afforded of studying these animals, and watching the variations which the horns of the species present, have shown that several most distinct but allied species, as the Stag of Canada and India, have horns so similar that it is impossible to distinguish them by their horns. On the other hand, it has been shown that animals of the same herd, or even from the same parents, and sometimes even the same specimen, under different circumstances, in succeeding years have produced horns so unlike one another in size and form, that they might have been considered, if their history was not known, as horns of very different species. These observations, and the examination of the different cargoes of foreign horn which are imported for the uses of the cutler, each cargo of which is generally collected in a single locality, and therefore most probably belong to a single species peculiar to the district,—have proved to me that the horns afford a much better character to separate the species into groups, than to distinguish the allied species from one another.

Colonel Hamilton Smith, in his Monograph of the Genus, separated them into subgenera according to the form of the horns.

In the Proceedings of the Zoological Society for 1836 I drew attention to the glands on the hind-legs as affording very good characters to arrange the subgenera proposed by De Blainville and Colonel Smith into natural groups, which in most particulars agreed with the geographical distribution of the species.

Dr. Sundevall, in his Essay on Pecora, has availed himself of the suggestions in my paper, and has also pointed out some other external characters, such as the form and extent of the muffle, which afford good marks of distinction in these animals,—such as I believe are much more important for the distinction of the genera and species than those derived from the form of the skull or the modifications of the teeth, or the form and size of the horns; as they are not, like those parts, so liable to alteration from age, local circumstances and

other changes during the growth of the animal, and they can be seen in the females as well as the males, which is not the case with the horns, as they can only be observed in the male sex.

The Deer may be thus divided :

- A. The DEER OF THE SNOWY REGIONS have a very broad muzzle, entirely covered with hair ; the horns are expanded and palmated, and the fawns are not spotted.
 - a. The *Alcine Deer* have no basal anterior snag to the horns, and a small, bald muffle between the nostrils, as the genus *Alces*.
 - b. The *Rangerine Deer* have a large basal anterior snag to the horns, close on the crown or burr, and no muffle, as *Tarandus*.
- B. The DEER OF THE TEMPERATE OR WARM REGIONS have a tapering muzzle, ending in a bald muffle ; the fawn, and sometimes the adult, are spotted.
 - c. The *Elaphine Deer* have a distinct anterior basal snag to the horns, the muffle broad, and separated from the lip by a hairy band, and the tuft of hair on the outside of the hind-leg above the middle of the metatarsus, as *Cervus* and *Dama*.
 - d. The *Rusine Deer* have a distinct anterior basal snag to the horns, the muffle very high, and not separated from the edge of the lip, and the tuft of hair on the outside of the hind-leg above the middle of the metatarsus, as *Recervus*, *Panolia*, *Rusa*, *Axis*, *Hylaphus*, and *Cervulus*.
 - e. The *Capreoline Deer* have no basal anterior snag to the horn, the first branch being some distance above the burr ; the suborbital crumen (and pit in the skull) generally small, as *Capreolus*, *Carriacus*, *Blastocerus*, *Furcifer*, and *Coassus*.

The *Alcine* and *Rangerine Deer* are confined to the Northern part of both continents ; the *Elaphine* and *Rusine Deer* to the Eastern World, the latter almost exclusively to the warmer part of Asia ; the *Capreoline Deer* are peculiar to America. The only exception to these rules are, the Wapiti Deer of the *Elaphine* group is found in Northern America, and the *Roebuck* and *Ahu* of the *Capreoline* group are found in Europe and North Asia.

A. The DEER OF THE SNOWY REGIONS have a very broad end to the nose, which is entirely covered with hair, a short tail and palmated horns ; the fawns are not spotted, but uniformly coloured like the adult ; the skull with a large nose-cavity, and with the intermaxillaries not reaching to the nasal.

a. The ALCINE DEER or ELKS have no basal snag, the first branch of the horn being considerably above the crown.

1. ALCES; *Alce*, H. Smith.

The muzzle is very broad, produced, and covered with hair, but there is a small, moist, naked spot in front of the nostrils; the neck is short and thick; the hair is thick and brittle; the throat is rather maned in both sexes; the hind-legs have the tuft of hair rather above the middle of the metatarsus; the males have palmate horns. The nose-cavity in the skull is very large, reaching behind to a line over the front of the grinders; the intermaxillaries are very long, but do not reach to the nasal; the nasals are very short. They live in woods in the northern parts of both continents.

1. ALCES MALCHIS. The ELK or MOOSE.

Dark brown; legs yellow.

Alces, Gesner; Plin.—*Cervus Alces*, Linn. S. N. i. 92; Pallas, Zool. R. A. i. 201; H. Smith; Richardson, Fauna Bor. Amer. 232.—*Alces Malchis*, Ogilby, P. Z. S. 1836, 135; Gray, Knows. Menag. 56.—*Moose Deer*, Dudley, Phil. Trans. n. 368. 165.—*Elk*, Laws, Carol. 123; Pennant, Syn.—*Elan*, Brisson, H. N. xii. t. 7. Supp. vii. t. 25; Cuvier, R. A.—*Original*, La Houtan, Voy. 72; Charlev. Nouv. France, iii. 126.—*American Black Elk* (*C. alces* β.), H. Smith, G. A. K. v. 771.—*Loss*, Russians in Siberia.

Inhabits the Northern regions of America and Europe.

Several naturalists, especially Colonel Hamilton Smith, thought they had observed a difference in the horns of the Russian and American Elks; I have compared numerous specimens from both countries, but can discover no appreciable distinction between them.

The Elks, like most of the other Deer, and especially of the animals which inhabit the cold and mountain regions, present a very considerable difference in size, according to the scarcity or abundance of the food which the locality they inhabit affords, and the development of the horns appears to be greatly influenced by this cause; so that the horns of the animals inhabiting the more barren districts are much less developed than those found in more fertile situations, and I think I have observed this to be the case with both the Russian and the American horns: but on this head naturalists are like to be much misled, as the horns which are imported are generally chosen for their size and perfect development, and the small and less-developed specimens are only to be observed in the cargoes of horns which are imported for economic purposes.

These observations are equally applicable to the *Rein Deer*.

b. The RANGERINE DEER or REINS have a large and well-developed basal branch close on the crown of the horns.

2. TARANDUS; *Rangifer*, H. Smith.

The muzzle is entirely covered with hair; the tear-bag small, covered with a pencil of hairs; the fur brittle, in summer short, in winter longer, whiter, of the throat longer; the hoofs are broad, depressed, and bent in at the tip; the external metatarsal gland above

the middle of the leg; horns in both sexes elongate, subcylindric, with the basal branches and tip dilated and palmated; of the females smaller; skull with rather large nose-cavity, about half as long as the distance to the first grinder; the intermaxillary moderate, nearly reaching to the nasal; a small, very shallow, suborbital pit.

They live in the Arctic Regions in both hemispheres, migrating in flocks, and eating lichens.

1. TARANDUS RANGIFER. The CARIBOU or REIN DEER.

Dark brown in summer, grey in winter. Young: brown, yellow varied.

Tarandus, Plini.—*Rangifer*, Gesner.—*Cervus Tarandus*, Linn.; Pallas, Zool. Ross. A. i. 106; Cuvier, Mamm. Lith. t. ; Bennett, Gardens Z. S. 241. fig.; Richardson, Fauna Bor. Amer. 238.—*C. Tarandus sylvestris* (*Woodland Caribou*), Richardson, Fauna Bor. Amer. 250.—*C. rangifer*, Raii Syn. 88.—*C. platyrhynchos*, Vrolich, Rendier, t. 2 (1828).—*C. palmatus* and *C. mirabilis*, Jonston, Quad. t. 36, 37.—*Tarandus rangifer*, Gray, Knows. Menag. 57.—*Rein Deer*, Pennant.—*Caribou*, Sagard, Theodat. Canad. 751.—*Renne*, Buffon, H. N. xii. 79. t. 10–12. Supp. iii. t. 18*.—*Rhenne*, Cuvier, R. A.—*Caribou* or *Carrebauf*, French Canadians.—*Oleen*, Russians in Siberia.

Var. Smaller; horns more slender, less palmated; hair short, smooth, close, brown, with throat and belly white in summer; hair very close, thick, waved, brittle and erect and white in winter.

Cervus Tarandus Americanus, H. Smith, G. A. K. v. 773.—*C. Tarandus v. Arctica* (*Barren-ground Caribou*), Richardson, Fauna Bor. Amer. 241. fig. 240, horns.—*Common Deer*, Hearne, Journ. 195. 200.

Inhabits Arctic parts of Europe and America.

Varies exceedingly in size. In the British Museum there are specimens varying from 20 to 28 inches high at the withers, and proportionally as large in the horns and all the other parts. The variety is confined to the barren grounds.

Dr. Richardson observes, "There are two well-marked and permanent varieties of *Caribou* that inhabit the fur countries; one of them (*Woodland Caribou*) confined to the woody and more southern districts, and the other (*Barren-ground Caribou*) retiring to the woods only in the winter, but passing the summer on the coasts of the Arctic seas, or on the barren grounds so often mentioned in this work."—*Fauna Bor. Amer.* 299.

The large Siberian variety are ridden on by the Tungusians. They also use them for draught, as the Laplanders do the smaller variety.

They have a large variety in Newfoundland, nearly as large as a heifer, having very large and heavy horns. There are some horns of this variety in the British Museum. M. Middendorf informed me that the horns of the large Siberian variety were as large as, and greatly resembled, the horns from Newfoundland (Nova Scotia) in the British Museum Collection.

Pallas observes, "*Americæ forte continua gregatim verno tempore per glacies admigrant, paulo diversi a Siberiæ inquilinis et verosimilime Americani.*"—*Zool. Ross. Asiat.* i. 208.

NO. CCXV.—PROCEEDINGS OF THE ZOOLOGICAL SOCIETY.

B. The **DEER OF THE WARM OR TEMPERATE REGIONS** have a tapering nose, ending in a naked, moist muffle; they generally have a well-developed tail, distinct crumen, and rather long false hoofs; their fawns are spotted, the spots generally disappearing in the adult, or only to be seen when the animals are in high condition; the fur is shorter and fulvous in the summer, becoming longer and greyer in the winter; the skulls have a moderate nose-cavity, and the intermaxillaries reaching to or nearly to the nasal bones.

c. The **ELAPHINE DEER OR STAGS** have a low, broad muffle, narrowed and rounded below, and nearly separated from the edge of the lip by a hairy band, which has only a narrow interruption in the middle, and rather elongated ears; they have rough horns, generally supported on a more or less long process of the frontal bones, furnished with a frontal basal branch or snag close on the burr or crown; the outer side of the hind-legs has a tuft of hair placed rather above the middle of the metatarsus, and another tuft on the inner side of the hock.

They are (except the *Wapiti*) exclusively confined to the woods of the Old or Eastern World.

3. CERVUS; *Elaphus*, H. Smith; *Cervus* and *Pseudocervus*, Hodgson.

Horns round, erect, with an anterior basal snag, a medial anterior snag, and the apex divided into one or more branches, according to the age of the animal; a well-developed crumen; narrow triangular, compressed hoofs; they are covered with brittle, opaque hairs; the rump is generally ornamented with a pale mark; skull with a large, deep, suborbital pit.

* The *True Stags* have one or two branches on the middle of the front of the beam.

† The *American kind* have rather broad semicircular hoofs, a very short tail, and the withers covered with softer hair in winter. *Strongyloceros*.

1. CERVUS CANADENSIS. The WAPITI.

Red-brown; rump with a very large pale disk extending far above the base of the tail, and with a black streak on each side of it; male with hair of throat elongated, black, with reddish tips.

Stag, Dale, Phil. Trans. n. 444, 384.—*Cerf de Canada*, Perr. Anim. ii. 55. t. 45?; Cuvier, R. A. i. 256.—*Cervus Canadensis*, Brisson; Gray, Knows. Menag. 58.—*Cervus Elaphus*, var. *Canadensis*, Erxl.—*Cervus Strongyloceros*, Schreb. t. 247; Richardson, Fauna Bor. Amer. 251.—*C. major*, Ord.—*C. Wapiti*, Leach, Journ. Phys. lxxxv. 66.—*American Elk*, Bewick, Quad.—*North-Western Stag*, *C. occidentalis*, H. Smith, G. A. K. iv. 101. t. . f. 2, horn; Fischer, Syn. Mamm. 614, not Syn.—*Wapiti*, Warden, États Unis, v. 638; Wied, Voy. Amer. Sept. iii. 302.

Var. Smaller.

Red Deer (or *Canadian Stag*), Warden, États Unis, v. 637.—*Elk*, Lewis and Clerk.—*Stag*, Pennant, Arct. Zool. i. 27.—*Wewaskiss*, Hearne, Journ. 360.

Inhabits N. America.

In summer red-brown; ears, middle line of the back of the neck, and back of rump and front of legs blackish; rump-mark yellowish.

†† The species of the *Western World* have narrow, triangular hoofs, a moderate tail, and are covered with harsh hair. *Cervus*.

2. CERVUS ELAPHUS. The STAG.

Brown; rump with a pale spot extending rather above the upper surface of the base of the tail.

Cervus, Plin.; Gesner.—*Tragelaphus*, Gesner (old male).—*Cervus Elaphus*, Linn.; Gray, Knows. Menag. 58.—*C. vulgaris*, Linn.—*C. nobilis*, Klein.—*C. Germanicus*, Brisson.—*C. Elaphus* β. *Hippelaphus*, Fischer, Syn. (old male).—*Stag*, or *Red Deer*, Pennant.—*Cerf*, Buffon, H. N. vi. t. 9.—*Cerf commun*, Cuvier; F. Cuvier, Mamm. Lith. t. .

Inhabits Europe.

Mr. Blyth described a variety as the *Hungarian Stag* (Mus. Asiat. Soc. Beng. 1841, 750. t. 3. f. 11).

The Deer which Buffon (H. N. vi. 95. t. 11) describes under the name of the *Cerf de Corse*, has been regarded as a variety to be distinguished by the smallness of its size, but Buffon observes, that he believes the "size to depend on the scarcity of nourishment; for when moved to better pastures, in four years they became higher, larger and stouter than the Common Stags."

3. CERVUS BARBARUS. The BARBARY DEER.

Dark brown; obscurely white spotted, with a very indistinct, greenish brown, broad dorsal line, with a pale yellow spot extended considerably above the base of the tail; back of haunches white, with a dark stripe on each side.

Cervus Barbarus, Bennett, MSS. Catal. Gardens Zool. Soc.; Gray, Knows. Menag. 59; Frazer, Zoologia Typica, t. .—*Burk-Goat* (*Al-Wassai*), Moors (see Griffith, A. K. v. 775).

Inhabits Coast of Barbary; Tunis.

4. CERVUS WALLICHII. The BARA SINGA or MORL.

Brown, with a very large white spot on the rump, extending on back of the haunches and far above the base of the tail; the horns with two basal and one or two apical branches.

Cervus Pygargus, Hardw. Linn. Trans.—*Cervus Wallichii*, Cuvier, Oss. Foss. iv. 50; F. Cuv. Mam. Lith. from Hardw. Icon.; Sundev. Pecora, 55; H. Smith, G. A. K. iv. 103. t. . (from Indian drawing); Gray, Knows. Menag. 60.—*Jaareel Stag*, Blyth, Journ. Asiat. Soc. Bengal, 1841, 750. t. . f. 7, young horn; Hodgson, Icon. ined. t. 198, called *Gyana*.—*Pseudocervus Wallichii*, Hodgson, Journ.

Asiat. Soc. Bengal, x. 914, xi. 284.—?*Cervus Caspianus* or *Hangool*, Falconer, MSS.; Gray, Cat. Osteol. Sp. B. M. 147.—?*Cervus Cashmeriensis*, Gray, Cat. Osteol. Sp. B. M. 65.—*Kashmir Stag?*, Blyth, P. Z. S. 1840, 72; Journ. Asiat. Soc. Bengal, 1841, 750. t. . f. 8, 9. —*Persian Deer*, *Marùl* or *Gezezu* or *Gookoohee*, MacNeil, P. Z. S. 1840, 11; Blyth, Journ. Asiat. Soc. Bengal, 1841, 750. t. . f. 10.

Inhabits Cachir (*Hodgson*); Persia (*MacNeil*).

The skull of Dr. Falconer's *Cashmere Stag* is 15 inches long; the suborbital pit is oblong, triangular, and rather deep. The skull and horns are very like Mr. Hodgson's specimen of *Cervus affinis*, but they are considerably smaller.

Sir John MacNeil informs us they are called by the Persians *Marùl*, or *Gezezu*, or *Gookoohee*, and are frequently noticed in their literature. It is found in all the wooded mountain districts of Persia, but apparently does not occur in the central parts of the country. They rarely descend into the plains. During the summer they are found in the highest wooded parts of the mountains, and during the winter in the lower ravines, near their bases, where they are frequently tracked in the snow. The horns of the adult males closely resemble those of the Red Deer of this country; insomuch that I doubt whether an unscientific observer could distinguish them, except by the superior size of those of the *Marùl*.—P. Z. S. 1840, 11.

5. CERVUS AFFINIS. The SAUL FOREST STAG.

Pale brown; rump without any distinct pale mark?; skull 16 or 17 inches long; suborbital pit large, oblong, trigonal, rather deep.

Cervus affinis (*Mool Baratingha*, or *Royal Stag of the Morung*), Hodgson, Icon. ined. B. M. n. 197; Journ. Asiat. Soc. Bengal, x. 741, 914; Calcutta Journ. N. H. iv. 291; Sundev. Pecora, 131; Gray, Cat. Ost. Sp. B. M. 65; Knowsley Menag. 60.—*C. Elaphus*, Hodgson, Journ. Asiat. Soc. Bengal, iv. 648.—*C. Wallichii*, part, Gray, Cat. Hodgson's Coll. in B. M. 32.—*C. Wallichii*, var. Blyth, Journ. Asiat. Soc. Bengal, 1841, 747.

Inhabits India; Saul Forest.

Mr. Hodgson, in his figure of this animal, does not represent any pale spot on the rump: if this is correct, it must be a most distinct species, as Dr. Falconer informs me the *Cashmere Stag* has a large white rump.

6. CERVUS SIKA. The SIKÁ.

Dark brown; cheeks and throat rather paler; rump brown, without any pale spot; tail pale, white beneath; hair harsh; horns rather slender, with a basal and medial snag, and a subapical internal one.

Cervus Sika, Schlegel, Fauna Japon. t. 17; Sundev. Pecora, 55, 131; Gray, Knows. Menag. 60.—*C. Sitza*, Temm. Mus. Leyden.

Inhabits Japan. Mus. Leyden.

4. DAMA, H. Smith; *Platyceros*.

Horns, upper part expanded, smooth, and branched on the hinder edge; tail rather elongated; tear-bag well developed; hoofs narrow,

triangular, compressed ; they are covered with thin, rather adpressed hairs, and have the hair of the nape reversed ; the fur is spotted in summer ; the skull with a short broad face, an oblong, rather shallow, infraorbital pit ; intermaxillary broad, reaching to the short broad nasals.

1. DAMA VULGARIS. The FALLOW DEER.

Fulvous ; white spotted, with the longitudinal streak on the lower part of the side, and the line across the haunches white.

Var. From nearly black to nearly pure white.

Platyceros, Plin.
—*Cervus platyceros*, Raii Quad. 85.—*Cervus dama*, Linn.—*Dama vulgaris*, Gesner, Quad. 335. f. ; Gray, Cat. Osteol. Sp. B. M. 65 ; Knows. Menag. 60.—*Fallow Deer and Buck*, Pennant.—*Daim et Daime*, Buffon.—*Daim fauve*, F. Cuvier.—*Cervus coronatus*, H. Smith, G. A. K. iv. t. . f. 4, from monstrous horns.

Var. Blackish.

Cervus mauricus, F. Cuv. Bull. Soc. Phil. 1816.—*C. Dama maura*, Fischer.—*Daime noire*, F. Cuv. Mam. Lith.

Inhabits Persia. Domesticated in Europe.

This species is represented in the sculptures from Nineveh.

d. The **RUSINE DEER** or **SAMBOOS** have a large moist muffle, which is as high as broad, and extends to the edge of the upper lip ; hind-leg with a large tuft of hair rather above the middle of the metatarsus, and with a pencil of hair on the inner side of the hock ; a moderate tail, broad, short ears, and the fur consisting of hard, rather shining, thick, depressed hair ; they have no white mark on the rump. The horns are cylindrical, generally rather longly peduncled, with a distinct anterior basal branch or snag close on the burr or crown, and are forked, and sometimes reforked, at the tip ; they have no medial snag. The skulls have a large, very deep, suborbital pit. They are confined to South-Eastern Asia and its islands.

* In some the upper part of the horns is variously branched.

5. PANOLIA, Gray.

The horns round, curved backwards and outwards, with a large anterior basal snag close on the burr ; the upper part bent in, forked, becoming rather expanded and branched on the inner or hinder edge ; the fur formed of rather rigid, flattened hair ; muffle large ; skull with a narrow face, a large, oblong, very deep suborbital pit, and the nasals short, broad, and dilated behind ; the frontal snag of the horns often has a tubercle or branch at the base.

1. PANOLIA EEDII. The SUNGNAI.

Panolia Eedii, Gray, Cat. Hodgson's Coll. B. M. 34 ; Knowsley Menag. 61.—*P. acuticornis*, Gray, Cat. Mam. B. M. 180.—*P. platyceros*, Gray, Cat. Mam. B. M. 180 (adult horn).—*Cervus lyratus*, Schinz, Syn. ii. 395.—?*Cervus Smithii*, Gray, Proc. Zool. Soc. 1837, 45.—*Cervus Eedii*, Calcutta Journ. N. H. ii. 413. t. 12.—*Cervus*

(*Rusa frontalis*, McClelland, Calcutta Journ. N. H. i. t. 12. f. 1, ii. 539, iii. t. 13; Sundevall, Pecora, 132.

Inhabits India.

General Hardwicke has a drawing of a Deer, the frontal snag of the horns very much elongated, and apparently forked: Colonel Hamilton Smith made an "improved" drawing from the sketch; and in the Proceedings of the Zoological Society for 1837 I mention the species under the name of *C. Smithii*, p. 48.

I am now doubtful if the sketch might not have been intended for this species or a new one allied to it.

6. RUCERVUS, Hodgson; *Rusa*, sp. H. Smith.

Horns cylindrical, with an anterior basal branch, and repeatedly forked at the tip; muffle large, high, continued to the edge of the upper lip below; they have a rather short, thick tail, a shortish face, a well-developed crumen, broad rounded ears, covered with hair, and narrow compressed hoofs. The fur is formed of rather soft adpressed hairs; they have no pale mark on the rump, and are indistinctly spotted. The skull has an elongate face, with a large nose-opening, and an oblong, rather shallow, suborbital pit.

1. RUCERVUS DUVAUCELLII. The BAHRAIYA.

Yellowish brown, without any rump-spot; back with an indistinct dark streak, with a row of white spots on each side; sides not spotted; hair black, with yellow tips; neck with rather longer hair; throat, chest and belly with longer, scattered, greyish white hairs; muzzle and front of leg dark; chin white. Fur in winter dark brown.

Cervus Duvaucellii, Cuvier, Oss. Foss. iv. t. 29. f. 6, 8.—*Rucervus Duvaucellii*, Gray, Cat. Hodgson's Coll. B. M. 33.—*Rucervus elaphoides*, Hodgson.—*R. Duvaucellii*, Gray, Knows. Menag. 61.—*Cervus Bahrainja*, Hodgson.—*C. enclocercus*, Hodgson.—*C. Bahrainja*, Hodgson, P. Z. S. 1836, 46.—*C. Euryceros*, Knowsley Menag. t. 40, 41.—*Bahrainja*, Hodgson.

Inhabits India.

* The *True Rusas* have the upper part of the horns simply forked.

7. RUSA, H. Smith; *Cervus Hippelaphi***, Sundevall.

They are covered with hard, rigid, very thick hairs; they are not, or only obscurely, spotted; the horns are placed on a moderately long peduncle, have an anterior frontal snag close on the crown, and are simply forked at the tip.

† The *Larger kinds* have the hair of the neck elongated, forming a kind of mane, at least in the males.

1. RUSA ARISTOTELIS. The SAMBOO.

Tail not floccose, brown, rather darker at the end; blackish brown, with the feet, the region of the vent, and a spot over the eyes fulvous. Male maned. Young obscurely white spotted (*Hodgson*).

Gona Rusa, Daniel, Ceylon, t. — *Cervus Aristotelis*, Cuvier, Oss. Foss. iv. 502. t. 39. f. 10; F. Cuv. Mam. Lith. t. ; Sundev. Pecora, 55.—*Cervus Hippelaphus*, *C. Aristotelis*, and *C. heteroceros*, Hodgson, Icon. ined.—*Rusa Aristotelis*, H. Smith; Gray, Cat. Hodgson's Coll. B. M. 67; Osteol. Spec. B. M. 67; Knows. Menag. 62.—*Cervus unicolor*, H. Smith, G. A. K. v. 780.—*Cervus Bengalis*, Schinz, Syn. Mam. ii. 390.—*Daim noir de Bengal*, Duvaucell, Asiat. Res. xv. 157.—*Cerf noir de Bengal*, F. Cuvier, Menag. Lith. t. — *Cervus equinus* (*Samboo Deer*), Bennett, Tower Menag. 185, fig.—*Elk*, Indian Sportsmen; Sykes, Proc. Zool. Soc.—Var. *Cervus heteroceros*, Hodgson, J. A. S. Beng. 1841, 722. t. .

Var. ? *Biche de Malacca*, F. Cuv. Mam. Lith. t. female.—*Cervus Malaccensis*, Fischer, Syn.

Inhabits India; Ceylon.

The skull is about 17 inches long, and has a very deep, oblong, subtriangular, suborbital pit.

The specimen from Ceylon, in the Zoological Gardens, differs from the common Samboos from India in having shorter and thicker horns.

Nearly black in October; the front of the muzzle rounded, the nose black, forming a band across the chin; front of chin (only) white; tail all black; face paler than back, and more grised, but uniformly coloured, without any black streak over the eyes or up the side of the nose; vent flesh-coloured. Much larger.

2. RUSA DIMORPHE. The SPOTTED RUSA.

Red-brown; back with distinct series of small white spots; sides indistinctly white spotted; limbs paler; neck and belly blackish; chin white; the horns (deformed?). Young bright fawn-red, white spotted.

Cervus Dimorphe, Hodgson, Journ. Asiat. Soc. Bengal, 1844, t. ; Ann. & Mag. Nat. Hist. xiv. 74; Sundevall, Pecora, 132.—*Rusa Dimorpha* (*Hodgson's Rusa*), Hodgson in Gray, Cat. Hodgson's Coll. in B. M. 33; Gray, Knows. Menag. 62.

Inhabits Saul Forest; Morang.

3. RUSA EQUINUS. The RUSA or SMALLER SAMBOO.

Brown, not spotted; tail rounded, floccose, black at the tip; hair (summer) elongate, rigid, thick, waved. Young very obscurely spotted; hair rigid and rough.

Rusa, Raffles, Linn. Trans. xiii. 263.—*Cervus equinus*, Cuvier, Oss. Foss. iv. 44. t. 5. f. 30, 37, 38, 42; H. Smith, G. A. K. iv. 112. t. ; Sundevall, Pecora, 55; S. Müller, Nederl. Verh.—*Eland* or *Elk* of the Dutch Sportsmen.—*Rusa Equinus*, Gray, Knows. Menag. 62. t. 43.

Inhabits Sumatra; Borneo.

4. RUSA HIPPELAPHUS. The MIJANGAN BANJOE.

Greyish brown; tail not floccose, brownish at the tip; anal region not pale; cheeks and upper part of the neck of the males maned; hair (summer) short, rigid, close-pressed, not waved. Young: hair smooth.

Rusa ubi, *R. saput* and *R. Tunjuc*, Raffles, Linn. Trans. xiii. 260.
 — *Cervus hippelaphus*, Cuvier, Oss. Foss. iv. t. 5. f. 31, 34 & 42 ;
 F. Cuvier, Mam. Lithog. t. ; Raffles, Mem. 645.—*Cervus Tunjuc*,
 Vigors, in Raffles' Memoir, 645.—*Cervus Rusa*, S. Müller, Nederl.
 Verh. 45. t. 43.—*Great Muntjac*, Waterhouse, Cat. Mus. Zool. Soc.
 1839, 39.—*Cervf noir de Bengal*, F. Cuvier, Mam. Lithog. t. 2, in
 summer.—*Cervus Leschenaultii*, Cuvier, Oss. Foss. v. , from
 horns only.—*Rusa Hippelaphus*, Gray, Knows. Menag. 62.
Var. Smaller. Eydoux, Guérin, Mag. Zool. 1836, 26.—*Cervus*
Moluccensis, Quoy.—*Cervus Rusa Moluccensis*, S. Müller, Nederl.
 Verh. t. 45 ; Mus. Leyden, 1845.—*Cervus Rusa Timorensis*, Mus.
 Leyden, 1845.

Inhabits Java.

In all its states it was very distinct from the Samboo of Continental India. The horns are similar to those of *R. Equinus*, but the body and horns are smaller, and the hair of the young is smoother.

** The *Smaller Rusas* have no mane ; the peduncles of the horns are rather elongated, and covered with hair.

5. RUSA PERONII. THE SMALLER RUSA.

Brown, paler beneath ; hair rigid, thick, ringed ; muzzle dark ; tail brown, floccose ; anal disk white ; the hind part of the feet hairy ; the horns are thick and heavy.

Cervus Peronii, Cuvier, Oss. Foss. iv. 46. t. 5. f. 41, 45 ; Sundev. Pecora, 56.—*Rusa Peronii*, Gray, Knows. Menag. 63.—*Cervus Kuhlîi*, S. Müller, Nederl. Verh. 45. t. 44 ; Sundev. Pecora, 56.—*Rusa Kuhlîi*, Gray, List. Osteol. Spec. B. M. 68.

Inhabits Timor, Luboc, Bavian and Ternate. Specimen in Brit. Mus.

6. RUSA PHILIPPINUS. PHILIPPINE RUSA.

Forehead brown ; end of nose and eyebrows brownish ; feet behind naked ; hair rigid, not waved.

Cervf de Philippine, Desm. Mamm. 442.—*Cervus Philippinus*, H. Smith, G. A. K. iv. 147. t. 164. f. 5. head, v. 803 ; Fischer, Syn. 622 ; Sundev. Pecora, 56.—*Rusa Philippinus*, Gray, Knows. Menag. 63.

Var.? Tail black, dependent ; front of face dark.

Cervus Marianus, Cuvier, Oss. Foss. iv. 45. t. 5. f. 30, 37, 38, 46 ; H. Smith, G. A. K. iv. 115. t. 168 (from Mus. Paris) ; Fischer, Syn. 453 ; Sundev. Pecora, 57.

Inhabits Philippines.

This species has the horn on an elongated peduncle, like the *Muntjacs*, but it is easily distinguished from them by the absence of the ridge and of the grooves on the face.

7. RUSA LEPIDA. THE LITTLE RUSA.

"Reddish brown ; back and sides varied with pale, spotted hair ; vent disk small, white, black edged above ; tail longly hairy, white, above black ; face brown, with a roundish white spot in front of the

usual oval black spot ; horns smooth, slender, nearly straight, elongate, the basal snag bent down on the forehead."—*Sundevall*.

Cervus (Hippelaphus) lepida, Sundev. Pecora, 57.—*Rusa lepida*, Gray, Knows. Menag. 63.

Inhabits Java. Mus. Frankfort. Scarcely as large as a Roebuck.

8. *Axis*, H. Smith ; *Hippelaphus* ***, Sundev.

Covered with moderately thick, polished hairs ; fulvous and beautifully white spotted at all seasons ; the face is elongate, narrow, and the ears large, rather elongate and acute, with a rather elongate tail, and nearly equally long, slender legs ; the horns are placed on moderately long peduncles ; the skull is elongate, narrow, with an oblong, rather small, deep suborbital pit.

1. *Axis maculata*. The *Axis* or *Chiltra*.

Fulvous, with a black dorsal streak, edged with a series of white spots ; sides with many white spots in an oblique curved line, and with a short white streak obliquely across the haunches.

Young fawn, spotted exactly like the adult.

Axis, Plin. ? ; Buffon, H. N. xi. t. 38, 39 ; Cuvier, Menag. Mus. t. ; Oss. Foss. iv. 38. t. 5. f. 24, 29.—*Cervus Axis*, Erxl. ; Schreb. t. 250 ; Bennett, Gard. Zool. Soc. 253 ; Sundev. Pecora, 57.—*Axis maculata*, Gray, Cat. Mamm. B. M. 178.—*A. major*, Hodgson, Journ. Asiat. Soc. Bengal, x. 914.—*A. minor*, Hodgson, Journ. Asiat. Soc. Bengal, x. 914.—*A. medius*, Hodgson, Icon. ined.—*Cervus pseudaxis*, Gervais, Voy. Bonite, 64. t. 12 ; Institute, 1841, 419 ; Sundev. Pecora, 57.—*C. Axis Ceylonensis*, H. Smith.

Var. Blackish. *Cervus nudipalpebra*, Ogilby, P. Z. S. 1831, 136 ; Sundev. Pecora, 57. 131.

Inhabits India.

The horns of this species vary greatly in size. Pennant describes two Deer under the names of 1. *Greater Axis*, Pennant, Syn. 52 ; Quad. 106 = *Cervus Axis* γ , Gmelin ; 2. *Middle-sized Axis*, Pennant, Quad. 106 = *Cervus Axis* β , Gmelin, from the horns alone : these are probably only large-horned examples of the common species ; 3. *C. pseudaxis*, which has been regarded as a species of *Rusa*, is only a small-horned variety.

9. *Hyelaphus*, Sundev. ; *Axis*, sp. H. Smith.

Covered with moderately thick, polished hair ; fulvous, and spotted in the summer ; with a rather elongated tail, and rather short legs, the front being rather the shortest ; the face is short, broad, and arched in front ; the ears short and rounded ; the horns are placed on moderately long peduncles.

1. *HYELAPHUS PORCINUS*. The *Lugna Para* or *Shgoriah*.

Brown or yellowish brown, with an indistinct darker dorsal streak, and with obscure whitish spots, but without any white streak on the sides or haunches ; in the winter brown and spotless ; front of face

and legs darker; line down the front and the inside of the thighs white.

Porcine Deer, Pennant, Syn. 42. t. 8. f. 2.—*Cerf Cochon*, Buffon, Supp. iii. 122. t. 18 (in summer).—*Cervus porcinus*, Zimmerm.; Schreb. t. 251; F. Cuvier, Mamm. Lithog. t. .—*Hyelaphus porcinus*, Sundev. Pecora, 58; Gray, Knows. Menag. 64. t. 42; Cat. Ost. B. M. 67.—*Axis porcinus*, Hodgson, Journ. Asiat. Soc. Bengal, x. 914; Gray, Cat. Hodgson's Coll. B. M. 33.—*Cervus niger*, Hamilton, Icon. ined.; Blainv. Bull. Soc. Philom. 1816, 76; Fischer, Syn. 454; Sundev. Pecora, 60. 132.

Inhabits India.

Easily known from the *Axis* by being lower on its legs, and there is no distinct black dorsal streak, nor white streak on haunches; the tail bushy, and often carried erect: the males and females in summer are reddish brown, with numerous white spots, the middle of the back rather darker; in winter the whole fur becomes blackish brown, and the spots disappear: the horns are generally short, with only short snags or branches, but they are sometimes as large as those of the *Axis Deer*.

10. CERVULUS, Blainv. 1816; *Muntjac*, Gray, 1821;
Stylocerus, H. Smith; *Prox*, Ogilby, Sundev.

Horns on elongated pedicels, supported by longitudinal ridges on the face, which have a naked, moist groove on their side; the canine teeth are exerted; the tear-bags are large and deep; the tail elongate and tufted; the hoofs triangular, and partly united in front by a web; the false hoofs are small and transverse; they are covered with thin shining hair, and are not spotted; they have no tuft of hair on the hind-legs; skull with a very large, deep, nearly hemispherical suborbital pit.

1. CERVULUS VAGINALIS. The KIJANG or MUNTJAC.

Dark reddish brown; narrow streak on the front edge of the thigh white.

Kijang, Marsden, Sumatra, 94.—*Cervus Muntjac*, Zimm. Schreb. t. 254; Horsfield, Java, vi. t. 1; Raffles, Mem. 645.—*Prox Muntjac*, Sundev. Pecora, 61.—*Cervus vaginalis*, Bodd, Elenc. i. 136.—*C. subcornutus*, Blainv. Schreb. t. 254 n. f. 2.—*Muntjac vaginalis*, Gray, Cat. Mamm. B. M. 173.—*Cervus aureus*, H. Smith, G. A. K. iv. 148. t. . v. 805.—*Ribbed-face Deer*, Penn.—*Chevreuil des Indes*, Allam, Buff. Supp. v. 41. t. 17, vi. 195. t. 26; Cuvier, Oss. Foss. iv. t. 5. f. 48, t. 3. f. 49, 54.—*Cervulus vaginalis*, Gray, Knows. Menag. 65.

Inhabits Sumatra; Java.

This chiefly differs from the following in being darker-coloured.

2. CERVULUS MOSCHATUS. The KEGAN or KAKER.

Bright reddish yellow; streak on front of thigh and under part of the tail white; chin and gullet whitish; hair not ringed.

Var. With a triangular white spot on each side of the chest.

Musk Deer of Nepal, Ouseley, Orient. Collect. ii. t. .—*Cervulus*

moschatus, Blainv. Bull. Soc. Phil. 1816, 77; Schreb. t. 254 n. f. 1; H. Smith, G. A. K. iv. 149. t. . v. 806.—*Cervus moschus*, Desm. Mamm. 441.—*C. Ratwa*, Hodgson, Journ. Asiat. Soc. Bengal, i. 146. t. head; P. Z. S. 1834, 99; Royle, Flora Cashm. t. 5. f. 2.—*Stylocerus Ratwah*, Hodgson, Journ. Asiat. Soc. Bengal, x. 914.—*Muntjacus vaginalis*, part, Gray, Cat. Hodgson's Coll. B. M. 31.—*Prox Ratwa*, Sundev. Pecora, 62.—*P. albipes*, Wagner, Suppl.; Sundev. Pecora, 62.—*P. stylocerus*, Wagner, Suppl.; Sundev. Pecora, 62, 64.—*Cervus melas*, Ogilby.—*Prox melas*, Sundev. Pecora, 62.—*Cervulus moschatus*, Gray, Knows. Menag. 65.

Inhabits India, Nepal.

3. CERVULUS REEVESII. The CHINESE MUNTJAC.

Greyish brown; hair short, paler ringed.

Cervus Reevesii, Ogilby, P. Z. S. 1838, 105.—*Prox Reevesii*, Wagner, Sundev. Pecora, 62.—*Cervulus Reevesii*, Gray, Knows. Men. 65. Inhabits China.

Mr. Ogilby observes, this species has a longer head and tail than the Common Indian Muntjac, also less red and more blue in the general shades of colouring, and is readily distinguished by the want of the white over the hoofs, which is so apparent in its congeners. The fawn is spotted.

The Earl of Derby has these three kinds at Knowsley; but they breed together, and it has hence become impossible to discriminate the mules from the original species.

c. The CAPREOLINE DEER or ROES have rugose, very shortly peduncled horns, without any basal snag or branch; the first branch arising some distance above the crown or burr; the upper part is more or less branched; the muffle is broad and naked; the suborbital gland and the pit in the skull are very small and shallow, except in *C. Pudu*. Some species have a distinct tuft of hair on the outer side of the metatarsus, and more have the pencil of hair on the inner side of the hock, and others are without either; indeed in some specimens of the same species the tuft of hair on the hinder legs is very visible, in others very indistinctly or not at all seen.

11. CAPREOLUS, H. Smith; *Capræa*, Ogilby.

Horns nearly erect, small, cylindrical, slightly branched, with a very short peduncle; they have no tail, but a large, white anal disk, a very indistinct tear-bag, and narrow triangular hoofs; the tuft on the hind-legs rather above the middle of the metatarsus; they are covered with thick brittle hair in winter, and thinner and more flexible hair in the summer; the adults are not spotted, and have a black spot at the angle of the mouth; the skull has a very small, shallow suborbital pit. Found in Europe and North Asia.

1. CAPREOLUS CAPRÆA. The ROEBUCK.

Inside of the ears fulvous; summer, red brown; winter, olive, pale punctuated; horns short.

Capræa, Plin.; Gesner.—*Capreolus*, Brisson.—*Cervus capreolus*,

Linn.; Pallas, Zool. Ross. A. i. 219.—*Capreolus Capræa*, Gray, Cat. Osteol. B. M. 64.—*Capreolus Europæus*, Sundev. Pecora, 61.—*Roe Buck*, Penn.—*Chevreuil* and *Chevrette*, Buffon, II. N. vi. 198.

Inhabits Europe. A larger variety is said to have formerly inhabited the Tyrol.

2. CAPREOLUS PYGARGUS. The AHU.

Interior of the ears fulvous; fur pale yellowish; horns elongate.

Cervus pygargus, Pallas, Reise, i. 97, 198, 433. ii. 159; Spic. xii. 7 (not Hardwicke); Schreb. Saugth. v. t. 253.—*C. capreolus* β , Pallas, Zool. Ross. Asiat. i. 219.—*Cervus Ahu*, Gmelin, Reis. iii. 496. t. 56; Griffith, A. K. iv. 122. t. —*Capreolus pygargus*, Sundev. Pecora, 61.—*Tailless Deer*, Pennant, Quad. i. 121.—*Tailless Roe*, Shaw.

Inhabits Central Asia. Collection of the British Museum.

12. FURCIFER, part. Wagner, Sundev.; *Mazama*, part. Gray, H. Smith; *Hippocamelus*, Leuckart, 1816; *Cerqueus*, Lesson; *Capreolus*? Gray.

Horns erect, forked, without any basal snag; ears narrow, acute; a short tail; covered with thick, brittle, waved hairs; there is a distinct pencil of hairs on the inside of the hock, but none on the outer sides of the metatarsus. Confined to South America. Differs from *Capreolus* in the want of the outer tuft on the leg.

1. FURCIFER ANTISIENSIS. The TARUSH or TARUGA.

Yellow grey; hairs rigid, quilled, brown, with a yellow subterminal ring; edge of muffle and throat white; face with a brown longitudinal streak, and a lyrate band between the eyes; the hoofs rather broad, worn in front.

Cervus Antisiensis, D'Orbigny, Voy. Amer. Merid. t. f.; Diet. Univ. H. N. iii. 328; Tschudi, Faun. Peru, t. 18; Sundev. Pecora, 60.

Inhabits East coast of S. America; Bolivian Alps.

2. FURCIFER HUAMEL. The GEMUL.

Fur dark, closely yellow punctated; inside of the ears white.

Equus bisulcus, Molina, Chili, 520; Fischer, Syn. Mamm. 430.—*Auchenia Huamel*, H. Smith, G. A. K. v. 764.—*Cervus Chilensis*, Gay et Gervais, Ann. Sci. Nat. 1846, 91.—*Cloven-footed Horse*, Shaw, Zool. ii. 441.—*Guemul*, Chilians.—*Gemul* seu *Huemul*, Vidaure, Chili, iv. 87.—*Camelus equinus*, Triverianus, Mus. Biol. ii. 179.—*Hippocamelus dubius*, Leuckart de Equo bisulco, 24. 1816.—*Cerqueus andicus*, Lesson, Nov. Tab. R. A. 173.—*Cercus (Capreolus) leucotis*, Gray, P. Z. S. 1849, 64. t. 12.—*Capreolus? Huamel*, Gray, Knows. Menag. 66.

Inhabits mountains on East coast of South America. Patagonia.

The female Gemul in the British Museum and in Lord Derby's Museum at Knowsley is considerably larger, and has the legs thicker, than the Siberian *Ahu*, which is much larger than the European Roe Buck.

MM. Gay and Gervais, who have compared the two species, consider them distinct.

13. *BLASTOCERUS*, Wagner, Sundev.; *Mazama*, sp. H. Smith;
Furcifer, part. Wagner and Sundevall.

Horns straight, erect, three-branched, without any basal snag; a very short tail, and rather large ears; are covered with very thin soft hair; they have a distinct pencil of hairs on the inside of the hock, but none on the outside of the metatarsus. Confined to Tropical America, east and west coasts.

1. *BLASTOCERUS PALUDOSUS*. The GUAZU-PUCO.

Fulvous; orbit, sides of muzzle, belly and under side of tail white; face-marks and feet blackish.

Cerrus paludosus, Desm. Mamm. 443; H. Smith, iv. 134. t. . v. 796; Fischer, Syn. 444, 616; Licht. Darst. t. 17; Sundev. Pecora, 59.—*C. palustris*, Desmoul. Dict. Class. H. N. iii. 379.—*Cerrus dichotomus* (*Guatzupucu*), Illiger, Abhand. Akad. d. W. 1804–1811, 117; Pr. Max. Neuw. Isis, 1821, 650. t. 6.—*Blastocercus paludosus*, Gray, Knows. Menag. 68.

Var.? *Mazama furcata*, Gray, Cat. Osteol. B. M. 64.

Inhabits the Brazils.

2. *BLASTOCERUS CAMPESTRIS*. The MAZAME or GUAZUTI.

Fulvous brown; the hairs of the lower part of the nape and front of the back reversed; the hoofs narrow. Young: middle of back not spotted; sides with small white spots, the upper series forming a regular line.

Mazame, Hernandez, Mex.; Buffon, H. N. xii. 317.—*Veado branco*, *Veado campo*, Anchieta, Notic. i. 127.—*Cerrus bezoarticus*, Linn. S. N. ed. 10. 67.—*C. campestris*, F. Cuvier, Dict. Sci. Nat. vii. 484?; Cuvier, Oss. Foss. iv. 51. t. 3. f. 46, 47.—*C. campestris*, Licht. Darst. t. 19; Pr. Max. Abbild. t. ; Darwin, Zool. Beagle, 29. fig. horns; H. Smith, G. A. K. iv. 136. t. . v. 797.—*C. leucogaster*, Goldfuss, Schreb. Saugth. 1127.—*Mazama campestris*, H. Smith; Gray, Cat. Osteol. B. M. 64.—*Biche de Savanne*, Buffon, Supp. iii. 126.—*Gouazouti*, Azara, Essai, i. 77.—*Furcifer campestris*, Gray, Knows. Menag. 68.

Inhabits S. America; N. Patagonia. Collection of British Museum.

The figure of *C. campestris* in F. Cuvier, Mamm. Lithog., is evidently a *Cariacus*, and not of this genus. The horns from Brazils figured by Cuvier (Oss. Foss. iv. t. 3. f. 48) appear to belong to quite a different species. It may be the variety of the Roebuck, figured in Griffith, A. K. iv. t. 164. f. 6.

14. *CARIACUS*, Gray; *Mazama*, Sundev.; *Mazama*, part. H. Smith.

Horns cylindrical, arched, with a central, internal snag, the tip bent forwards, and with the lower branches on the hinder edge; they are covered with soft thin hair, have a moderate tail furnished with long hair on the under side, a white anal disk, rather elongated, large, rounded ears; they generally have a tuft of white hair on the outer side of the hind-leg, rather below the middle of the metacarpus,

but it is sometimes not to be seen; the skull has a very small, shallow, suborbital pit, and the nasal bone is broad and subtriangular behind; the tail is elongate, slender, pale, with the lower part dark, and reaching nearly to the hocks in summer; much shorter and broader, and all dark olive in the winter. Confined to North America.

* *Hoofs narrow, elongate; tail hairy beneath.*

1. *CARIACUS VIRGINIANUS.* The AMERICAN DEER.

Bright fulvous in summer, greyer in winter; tail fulvous above, the tip black, beneath white; carried erect when running; nose brown; side of mouth white, with an oblique black band from the nostrils; hoofs narrow, elongate.

Dama Virginiana, Raii Syn. 86.—*Fallow Deer*, Lawson, Carol. 23; Catesby, Carol. App. 28.—*Cervus Dama Americanus*, Erxl. Syst. 312.—*Cervus Mexicanus*, Licht. Darstell. t. 20.—*Cervus Strongyloceros*, part, Schreb. Saugth. 1074, not figure.—*Cervus campestris* (*Mazama*), F. Cuv. Mam. Lithog. t. —*Cervus Virginianus*, Gmelin, S. N. i. 179; Desm. Mamm. 442; F. Cuvier, Mam. Lithog. t. 205.—*C. Manticorus*, Schrank, Ann. Wetter. i. 327, 1819, from Buffon.—*C. (Mazama) Virginiana*, Bennett, Gard. Z. S. 205; Fischer, Syn. 449; Peale, U. S. Explor. Exped. 39; Sundeval, Pecora, 58.—*Cervus leucurus*, Long-tailed Deer, Douglas, Zool. Journ. xv. 330; Richardson, Faun. Bor. Amer. i. 258.—*C. Mazama leucurus*, Sundeval, Pecora, 59.—*Cariacus Virginianus*, *C. leucurus*, and *C. Mexicanus*, Gray, Cat. Osteol. B. M. 63, 64.—*Virginian Deer*, Penn. Syn. 51. t. 9. f. 2; Quad. i. 104. t. 11. f. 1.—*Cerf de La Louisiane*, Cuvier, R. A. i. 256; Oss. Foss. iv. 33. t. 5. f. 1–5.—*Chevreuil*, Charlev. Nouv. Fran. iii. 152.—*Cariacus*, Buffon, H. N. xiii. 347. t. 44.—*Cariacus Virginianus*, Gray, Knows. Menag. 66. t. 46, winter coat.

Inhabits N. America.

Mr. Peale observes,—“We believe that the same species of Deer inhabits all the timbered or partially timbered country between the Coast of the Atlantic and Pacific Oceans. They vary in size, as all the animals of this genus do, in different feeding-grounds, but they are specifically the same.” The Mexican Deer (Penn. Syn. 54. t. 9. f. 3, and Quad. i. 20), *Cervus Mexicanus* (Gmelin, S. N. i. 179; H. Smith, G. A. K. v. 729, iv. 130. t. ; Cuvier, Oss. Foss. iv. t. 5. f. 23), *Cervus ramosicornis* (Blainville), are all described from horns, which only appear to be much-developed horns of this species which have belonged to some well-fed animals.

The horns described and figured as *C. clavatus* (H. Smith, G. A. K. iv. 132. t.), appear to be only varieties of the common form.

1. The *Cervus Mexicanus* (Lichten. Darst. t. 20; Sundeval, Pecora, 59),
2. The *Cervus nemoralis* (H. Smith, G. A. K. iv. 157. t. ; Sundeval, Pecora, 59),
3. The *Cervus gymnotis* (Wiegmann, Isis, 1833; Sundeval, Pecora, 59),

all from Mexico, appear to be varieties of this species. *C. Mexicanus*

is said to have a brown tail and indistinct chin-band. The nakedness of the ears, which is peculiar to *C. gymnotis*, is often to be observed in these animals when in change of fur. *C. spinosus*, Gay and Gervais, is only known from a single horn from Cayenne.

2. CARIACUS LEWISII. The BLACK-TAILED DEER.

The tail black above towards the extremity, yellowish white beneath, covered with hair at all seasons, not carried erect when running; fulvous (in summer); hair very soft, not ringed; forehead and upper part of face before the eyes blackish; inside of the legs and belly white; chin-band distinct, black; front hoofs narrow, elongate. Horns like *C. Virginianus*, but generally more slender, and commonly without the first antler.

Black-tailed Deer, Anglo-American in Oregon.—*Black-tailed Fallow Deer*, Lewis and Clerk, Travels to the Pacific, ii. 26, 125 (London edit. 1807).—*Cervus macrotis* β . *Colombiana*, Richardson, Fauna Bor. Amer. i. 257.—*Long-tailed Deer* (*Cervus macrourus*), H. Smith, G. A. K. iv. 134, v. 795, part; Fischer, Syn. 615.—*Cervus Lewisii*, J. Peale, U. S. Explor. Exped. 39. t. 9, ined. fig. at p. 43, fore-foot; Gray, Knows. Menag. 67. t. 44, in summer, t. 45, in winter fur.

Inhabits N.W. Coast of N. America.

3. CARIACUS PUNCTULATUS. The CALIFORNIAN ROE.

(Mammalia, Pl. XXVIII.)

Dark reddish brown (in summer), minutely punctulated by the yellow tips of the hair; chin-mark distinct; ears elongated, nakedish; base of the ears, orbits, round the muzzle, under side of tail, and the upper part of the inside of the leg, white; forehead, line down the face, and narrow streak on upper part of the nape black; legs brown; a very narrow, indistinct streak on the middle line of the rump yellowish; tail like back, with a blackish tip.

Inhabits California.

There is a female of this species in the Zoological Gardens. It is much smaller than the Black-tailed Deer, and darker than *C. Virginianus*, and it differs in the hair being dark, with a distinct yellow sub-terminal band.

**** The front hoof broad cordate; tail not hairy beneath.**

4. CARIACUS MACROTIS. The MULE DEER.

Brownish fulvous; chin without any or only an indistinct band; tail pale ferruginous, with a black tuft at the end, and without any hair beneath; ears very large; hoofs of the fore-feet broad cordate, nearly as broad as long, flattened and concave beneath; horns larger and more spreading than in *C. Virginianus*.

Mule Deer, Anglo-Americans of the Rocky Mountains.—? *Mule or Black-tailed Deer*, Le Raye; Lewis and Clerk, Travels; Wied, Voy. Amer. Merid. iii. 273, and Vig. A, B.—*Cervus macrotis*, Say, Long, Exped. Rocky Mount. ii. 88; H. Smith, G. A. K. v. 794; Fischer,

Syn. 444, 615 ; Sundeval, Pecora, 59 ; Richardson, Faun. Bor. Amer. 254. t. 20 ; Peale, U. S. Expl. Exped. 41. t. 10 (ined.), fig. at p. 43, fore-feet ; Gray, Knows. Menag. 67.—*C. auritus*, Desm. Dict. Class. H. N. iii. 379.

Inhabits N.W. America ; Arakansa.

We have several skulls of this genus in the British Museum, which offer very distinct characters, but unfortunately, not having the skins belonging to them, we cannot identify with certainty the species to which they belong.

These skulls vary considerably in width and comparative length of the face, and in the extent and depth of the suborbital pit ; in some, which are probably the skulls of the *Black-tailed Deer* as they come from the north-west coast, the pit is very large and deep ; and thirdly, in the extent of the intermaxillary lines. In some they scarcely reach to the nasal ; in others they reach to it and are united to it by a rather broad suture ; and in others they do not nearly reach to it, but stop abruptly, ending in a notch in the front upper edge of the maxillary.

There is imported by the North Western American Fur Company the flat skin of two Deer which probably belong to this genus, and appear distinct from the preceding : 1. The *Orenoka Deer* (of the Company's list). It came from Central America, is of a large size, of a bright red-brown colour, with the hair of the back short and rather adpressed, the chin and under part of the body white, the tail blackish ; 2. The *Yucatan Deer*, about the size of the *American Deer* (*C. Virginianus*), but very distinct from the skin of that species in the same store ; the fur is short red brown with blackish tips.

15. COASSUS, Gray ; *Subulo*, H. Smith, Sundeval.

Horns simple, rudimentary, shelving back ; ears rather short, broad, rounded ; tail short ; the facial line rather convex ; the fur short, of the forehead (in both sexes) elongate, forming a rhombic tuft between the horns and face ; legs without any tuft on the outside of the metatarsus, but with a pencil on the inside of the hocks. Confined to Tropical or South America.

* *Ears nakedish ; skull with a very small, shallow, suborbital pit ; supraorbital foramens in a groove.* East coast of America. *Coassus*.

1. COASSUS NEMORIVAGUS. The CUGUACU-APARA.

(Mammalia, Pl. XXII. XXIII. XXVII. f. 1, 3, 5.)

Pale brown ; the hair dull-coloured, brown, with a yellow subterminal band which wears off ; a paler streak over the eyes. Young : brown, white spotted ; spots of sides unequal ; nape dark. Skull elongate, suborbital pit broad, subtrigonal shallow ; grinders moderate, infra-orbital ridge very distinct, sharp-edged. The intermaxillaries do not reach to the nasal but fit into a notch in the maxilla.

Cereus nemoricagus, F. Cuvier, Dict. Sci. Nat. vii. 485 ; Cuvier, Oss. Foss. iv. 54. t. 5. f. 50 ; Fischer, Syn. 446, 618 ; H. Smith, G. A. K. iv. 142. t. ; Sundev. Pecora, 60 ; Licht. Darstel. t. 21.—



M. H. H. H. H. H.

J. H. H. H.

DEERUS NEMORIVAGUS



Harbar' imp'

LEAST NEW ORIVAGUS, ♀

J. W. C. 1870



W. L. L.

M. A. N. Hubbard, Prof.

1. & 2. CAPREOLUS NEMORIVA - US
3. & 4. CAPREOLUS RUPES

4. CAPREOLUS SUPERCILIARIS
6. CAPREOLUS AGRITUS



W. & H. Harbott Imp.

J. Wolf Lith.

Coassus nemorivagus, Gray, Cat. Osteol. B. M. 64; Knows. Menag. 68. t. 48.—*Cervus nemorum*, Desm. Mam. 446.—*C. simplicicornis*, Illiger, Pr. Max. Abbild. t. .—Young? *Moschus delicatula*, Shaw, Mus. Lever. t. 36.

Inhabits Brazils.

A male specimen at Knowsley Menagerie, drawn by Mr. Wolf in Nov. 1850 (Pl. XXII.), was dark brown; streak on each side of the forehead, upper part of the legs and spot on the angles of the lower lip blackish; streak over each eye yellowish; under lip and spot on upper lip near muffle, underside of the tail and inner side of the upper part of the thighs white; muffle smooth, bluish, upper edge slightly arched; ears small, lower half of the inner side black.

This male was the size of a full-grown Roebuck, as is the largest of the genus in the Menagerie.

There is a female at Knowsley (Pl. XXIII. and XXVII. f. 3), drawn by Mr. Wolf in November 1850, which is probably a young female of this species. Mr. Fraser thus described it: "A female: dark grey, tinged with brown, greyer on the head and neck; the lower part, and the inside of legs, the belly and round the eyes rust-coloured; the purple brown patch in the ears smaller and less distinct than *C. rufus*. A small white stripe in front of the eyes and the under surface of the tail white; from the eyes to the nose short and thick compared with the other specimens."

2. COASSUS RUFUS. The CUGUACU-ETE or PITA.

(Mammalia, Pl. XXIV. XXVII. f. 2.)

The fur bright shining red; crown and neck grey; sides of face and chest paler. Young: reddish, white spotted, spots of side unequal; nape with a distinct white-edged dark central streak; the muffle carunculated, rather angularly produced above.

Var. With white rings above the hoofs.

Cervus rufus, F. Cuvier, Dict. Sci. Nat. vii. 485; Cuvier, Oss. Foss. iv. 53. t. 3. f. 41, 42, t. 5. f. 44; H. Smith, G. A. K. iv. 140. t. .; Pr. Max. Abbild. t. .; Fischer, Syn. 446, 618; Licht. Darst. t. 20; Sundeval, Pecora, 60.—*Cervus simplicicornis* (*Apara* β.), H. Smith, G. A. K. iv. 141. t. .—*C. dolichurus*, Wagner, Supp. iv. 389.—*Cariacou de la Guyane*, Buffon, ix. 90.—*Biche rouge*, Buffon, Supp. iii. 126.—*Gouzou pita*, Azara.—*Coassus rufus*, Gray, Knows. Men. 69. t. 47.

Inhabits S. America.

The males cast their horns in the month of September, and they are very shortly replaced by a new pair.

Mr. Fraser has kindly sent me the following description of the female at Knowsley, figured by Mr. Wolf in November 1850 (Pl. XXIV.): "A female: light red brown, neck and head greyer; darker grey on the hocks and upper part of the fore legs; the forehead with one black stripe on each side a grey one in the centre, which leaves two brown yellow stripes on each side; ears with a purplish brown patch of about a third of the whole extent inside; the muffle is carunculated as figured Pl. XXVII. f. 2, of a purplish hue."

No. CCXVI.—PROCEEDINGS OF THE ZOOLOGICAL SOCIETY.

3. COASSUS SUPERCILIARIS. The EYEBROWED BROCKET.

(Mammalia, Pl. XXV. XXVII. f. 4.)

Bright shining red; neck and head grey; forehead darker; hocks and front of the fore legs grey; stripe in front of the eye and under-surface of the tail white; muffle deeply arched above; ears moderate.

Coassus superciliaris, Gray, Gleanings Knows. Menag. t. 48.

Inhabits the Brazils. Para.

This species chiefly differs from the former in the form of the muffle and in the presence of the white streak over the eyes. There is a male at Knowsley, and formerly there was a female in the Gardens of the Society.

4. COASSUS AURITUS. LARGE-EARED BROCKET.

(Mammalia, Pl. XXVI. XXVII. f. 6.)

Bright pale red brown; head and neck grey; orbits pale brownish; spot on side of upper lip, chin, belly, hinder side of fore and front side of hinder thighs and under side of tail, white; crown dark grey brown; ears very large, broad, acute, more than half the length of the head, with two lines of hairs in them.

Inhabits the Brazils.

There is a female of this species in the Gardens of the Society; it greatly resembles the Indian *Muntjac* in the distribution of its colour.

In the British Museum there are two skulls which belong to these species. They have the face shorter and thicker than the skull of *C. nemorivagus*, the nasals are wider behind; the suborbital pit small or less impressed, and the grinder larger.

The first belongs to a young specimen in the Museum Collection, apparently of *C. rufus*. It has a small slightly impressed pit just in front of the edge of the orbit. The second belongs to a more adult female, sent, without the skin, from Para by Mr. Reginald Graham; it is considerably larger than the preceding, and there is scarcely any visible impression in front of the orbit, only a slight concavity of the general surface. This skull exactly resembles that of *C. superciliaris*, which was in the Zoological Society's Gardens.

**** Ears thickly covered with short hairs; skull with a very deep oblong suborbital pit; face short; grinders large. West coast of America. Pudu.**

5. COASSUS PUDU. The VENADA.

Fur rufous, blackish in front and darker behind, and on the forehead and lower part of the leg; hairs ringed, of cheeks and neck greyish, of forehead and ears bright rufous; ears short; tail very short.

Cereus humilis, Bennett, P. Z. S. 1831, 27. fem.; Sundev. Pecora, 60.—*C. rufus*, Wagner, Supp. iv.—*Capra Pudu*, Molina.—*Checreuil*, Poeppig, Forriep's Notiz. 1829; Férussac, Bull. Sci. xix. 95.—*Cereus Pudu*, Gervais, Ann. Sci. Nat. 1846, 90.—*Antilope (Mazama) Temmamazama*, H. Smith, G. A. K. iv. 291?

Inhabits Chili; Conception and Chiloe (King). Brit. Museum.



M. A. N. Handkerchief

J. W. H. 1875

THE DEER

3. ON THE HABITS OF *HELIX LACTEA*.

By J. S. GASKOIN, F.Z.S. ETC.

As all facts relating to animated nature, elucidating the habits and powers of living creatures, however low their station in the scale of creation, must be interesting and instructive, I do not hesitate to place before the Zoological Society a few observations I have been enabled to make on some individuals of the genus *Helix*. In April 1849, I purchased four or five specimens of *Helix lactea* (African), and placed them in water to be cleaned for my cabinet; one, some hour or two after immersion, resuscitated, and escaped from the vessel. These specimens were selected from a great many others, all of which had been together in a dry dusty drawer in the dealer's shop for more than two years, and had been imported by a merchant of Mogadore, in whose possession they had remained, in a similar condition, for a still longer period. The test of submersion in water was afterwards practised on the whole stock of the dealer, and none reviving, it was concluded all were dead. I placed the living stranger under a large glass bell on a tub of earth, and it lived well on cucumbers and the outside leaves of cabbages, &c., quite alone, until the end of the following October, when I discovered about thirty minute black helices, not the twenty-fifth of an inch in diameter, crawling on the inside of the glass, on the mould, &c. At first I had doubts as to their origin, but with growth the markings and form of my African captive being approached, the point was no longer to be mistaken. Some of these are now (October 30, 1850) nearly as large as the parent, which measures $1\frac{1}{2}$ inch across the long diameter of the aperture, although the lip in no instance has begun to evert; thus twelve months have not sufficed to attain the adult state. Now as the *Helix* is known to be bi-sexual, and not hermaphrodite, it follows that in this instance impregnation or conception must have occurred prior to the capture of the animal, after which it fell into a state of suspended animation, and is traced to have remained so for more than four years; and we know nothing of the time it may have remained in the hands of the native gatherer before he took his collectings to the town dealer for sale; and I see no reason why, vitality having been latent for so lengthened a period, it might not have continued so almost indefinitely, and on the restoration of animation all the functions of the system resumed at once their natural powers: and what is most remarkable, utero-gestation resumed its process to accomplish the period, from the time it had been arrested, as though no circumstance had suspended the operation, and the time destined by Nature for its completion. I conclude the *Helix* to be insusceptible of prospective fecundation, that is, one communication of the sexes being sufficient for more than one conception, or there would probably before this time have been another brood of young ones, as the parent is still living and flourishing.

To render this paper more perfect, I will add a few other examples relating to the same subject. Dr. Baird has recorded in the 'Annals of Natural History' for July last, the circumstance of an Egyptian *Helix*, the "Snail of the Desert," the *Helix maculosa* of De Férussac, having remained gummed to a tablet in a show-case of the British

Museum during four years, when the existence of an apparently recently formed epiphragm being observed, it was removed from the tablet and placed in tepid water, and in a short time crawled away. It fed on cabbage-leaf, and began very soon the completion of a repair of the aperture of its shell, which had been broken prior to its capture, the suspension of animation having arrested the execution of the work. It resuscitated on the 15th of March last, but has shown neither signs nor result of fecundation, although still living.

I am indebted to Mr. T. Vernon Wollaston (who interspersed his entomological pursuits, during a two seasons' residence on the island, with a no less fruitful and valuable research in terrestrial conchology) for several species of living mollusks, principally *Helices*, indigenous to Madeira and its adjacent rocks: all these had lain in a box in dry canvas bags for a year and a half, and had been restored to vitality by placing them in water. They were put under glass shades, on flower-pots filled with mould, or in large glass cases, and all fed well. Three individuals of the *Helix undata* of Lowe, within forty hours, deposited more than two hundred small, white, semipellucid pearl-like eggs, which, on exposure to the air, soon became of an opaque white; not in a covering, nor agglutinated, but together, loose in the earth. One portion or nidus, about sixty in number, I immediately restored to their situation, about three-quarters of an inch below the surface, covering them with mould, hoping therefrom to learn the period of incubation. The parents burrowed their heads and bodies into the earth, remaining in that position some twenty or thirty hours, or forced themselves, shell and all, below the turf, and so deposited their ova. Other species have also produced eggs.

Curious and instructive as these facts may be, perhaps the continuance of the vital principle in mollusks removed from their native element may seem still more so, especially in the case of a bivalve, which has so much less perfectly the power of excluding the influence of atmospheric air on its animal substance; yet the latency of animation is a quality obviously necessary for the inhabitants of ponds and other shallows, which of course at certain seasons are liable to be dried, or the existence of the species would soon become extinct. An *Unio*, which lives in ponds, and much resembles the British species, *Unio tumidus* of Retzius, but is somewhat higher and shorter, was packed up by the Rev. Robert King, on the 26th of January 1849, at Wide Bay in Australia, having been enclosed in a dry drawer for 231 days, but was first submitted to the test of water, when its valves opened and it was alive. On its arrival at Southampton about the latter end of June 1850, 498 days after it had been taken from the pond, Mr. Newnham, to whom it was consigned, in consequence of what Mr. King had written, a second time placed it in water, when it expanded its valves and was living. It was then forwarded, *inter alia*, to the British Museum, and is restored to its element with full vital powers, in the care of Dr. Baird of that establishment, to whom I am indebted for this relation.

I have now living, the *Helix Fraseri*, Australia; *H. lactea*, Africa; *H. turricula*, Madeira; *H. laciniosa*, Madeira; *H. undata*, Madeira; *H. tectiformis*, Madeira; and the *Carocolla Wollastoni*, Madeira.



T. Woolf

M & W. H. H. H.

PALEORNIS DERBIANUS, Fraser



4. ON NEW BIRDS IN THE COLLECTION AT KNOWSLEY. BY MR. LOUIS FRASER. IN A LETTER TO THE SECRETARY.

(Aves, Pl. XXV.—XXIX.)

Knowsley Hall, November 11, 1850.

SIR,—Having received a notification, through Lord Derby, of my appointment to the Consulship at Whydah, my stay in England is necessarily drawing to a close. I have endeavoured to meet your wishes by forwarding a few brief descriptions from novelties contained in this extraordinary Collection, and with his lordship's permission I forward the original drawings made by Mr. Wolf, who has been engaged here for some considerable time.

I have the honour to be, Sir,

Your obedient servant,

LOUIS FRASER.

D. W. Mitchell, Esq., Sec. Zool. Soc. Lond.

The first specimen to which I would wish to draw the attention of the Society is a Parrakeet of large size, which I propose calling

PALÆORNIS DERBIANUS. (Aves, Pl. XXV.)

Forehead, round the nostrils, a small stripe from the nostrils to the eyes, and a broad moustache, black; head, towards the bill and round the eyes, green, passing into a light violet-blue on the occiput and ear-coverts; the remaining upper parts of the bird, the thighs, vent and under tail-coverts green, being more yellow on the back of the neck and centre of the wings; the shafts of the two centre tail-feathers dark purplish brown, with their webs, towards the apex, blue; from the hinder part of the ears, down the side of the neck, and behind the moustache, runs a narrow line of light rose-coloured purple, which colour extends over the whole under surface; the under side of the tail-feathers greyish yellow; bill black; feet the usual parrakeet colour; eyes pale straw-colour.

Length from base of beak to tip of tail, 20 inches.

Curve of upper mandible. $1\frac{1}{2}$ "

Wing $8\frac{3}{4}$ "

Tail $10\frac{1}{2}$ "

Hab. —?

This specimen has been many years in this collection, and I have chosen for its specific name that of its noble owner. The species is easily distinguished from all the other members of the genus by its larger size, and the colours of the bill, head and breast.

The next bird is a second species of the same genus.

PALÆORNIS ERYTHROGENYS. (Aves, Pl. XXVI.)

Male: Green; the back, between the shoulders, mealy; cheeks and ear-coverts red, which colour passes on to the hind head, where

it meets, in a more rosy tint; moustache black; the tips of the two centre tail-feathers blue; upper mandible red, lower black; legs grey.

| | |
|--|-------------|
| Length from base of bill to end of tail, | 15½ inches. |
| Curve of upper mandible | 1½ " |
| Wing | 7½ " |
| Tail | 9 " |

Hab. —?

This bird is nearly allied to *P. longicauda*, Bodd., but is larger; the tint on the cheeks is different; the belly and under wing-coverts are green; the primaries are not edged with blue; the centre tail-feathers are only blue for half their length; and the rump is green.

CRAX ALBERTI. (Aves, Pl. XXVII. XXVIII.)

Male: Black, with blue gloss; the lower part of the belly, vent, under tail-coverts, and the tips of the tail-feathers, white; cere beautiful azure blue; bill yellowish green horn-colour; eyes dark hazel.

Female: Red-brown; head and crest-feathers barred alternately with black and white; rump and tail barred with brown, yellow and dark brown; bill black horn-colour; eyes dark hazel.

Hab. —?

The pair of birds from which the accompanying descriptions and figures were taken, are now living in his lordship's aviaries. A new and beautiful species of a limited family like the Curassows must be looked upon as a valuable addition to our stock of ornithological acquaintances, and deserving of a distinguished cognomen. I therefore propose to name it after Her Most Gracious Majesty's illustrious consort, His Royal Highness Prince Albert, forming at the same time a companion to my *Goura Victoria*.

The male is at once distinguished from its nearest ally (*Crax Allector*, Linn.) by the blue cere: the female differs from all the specimens I have had an opportunity of examining by the broad bands on the tail.

PENELOPE NIGER. (Aves, Pl. XXIX.)

Male: Black, with blue, and in some lights green reflections; bill, throat (nearly naked), tarsi and feet red.

Female: Brown, with green reflections, each feather having several bars of rust-colour, the colour and markings being less distinct on the under surface of the bird.

| | |
|--|------------|
| Length from base of beak to tip of tail, | 23 inches. |
| Gape | 1½ " |
| Wing | 9 " |
| Tail | 11½ " |
| Tarsi | 2¾ " |

Hab. —?

There are three specimens in this museum, two males and one female; one of the males lived in the aviaries for many years.



W. H. C. Linn.

M. A. N. Hanhart Imp.

T. H. A. A. F. R. T. I. Fraser ♂





J. Wolf del.

M & N Hanhart

PENELOPE NIGER, Fraser

5. AN ACCOUNT OF FISHES DISCOVERED OR OBSERVED IN MADEIRA SINCE THE YEAR 1842*. BY THE REV. R. T. LOWE, M.A.

Family ZENIDÆ.

1. ZEUS CONCHIFER. *Lilacino-cinereus, capite inermi; thorace pinnaque dorsali analique utrinque scutatis; spinis dorsalibus anterioribus brevissime filamentosis; pinnis ventralibus 1+5-radiatis; caudali lunata.*

D. 9 v. 10+25 v. 26; A. 2 + (1+25 v. 26); P. 13; V. + 5;

- C. $\frac{1 + \overline{I. + V.}}{1 + \overline{I. + VI.}}$; M. B. 7; Vertebræ, 13 abd. + 21 caud. = 34.

An example of this very fine new Dory was communicated, with a short notice, to the Zoological Society in 1845†. The row of large and remarkable naked bony scutellæ on each side, at the base of the dorsal and anal fins, and along the breast or ventral line, afford a very striking character. They resemble the depressed shells of a *Fissurella* seen in profile, and are beautifully radiato-striate, with a bright iridescent rose or lilac lustre, like the inside of a *Trigonia*. The umbo forms a smooth short strong spine or recurved prickle. The dark thumb-mark on the middle of the sides is present, as in *Z. Galus*, L. Three examples only have occurred, measuring from eighteen inches to a little more than two feet in length.

The supposed affinity between *Zeus* and *Oreosoma*, Cuv.‡, is much corroborated by this fish.

2. ARGYROPELICUS OLFERSII. (*Sternoptyx Olfersii*, Cuv. R. An. (2nd edit.) ii. 316. t. 13. f. 2.)

A single example, caught with a boatscoop on the surface of the water in the Bay of Funchal, June 6, 1845.

The name of *Pleurothysis*, proposed in the 'Fishes of Madeira,' p. 64, for this portion of the Cuvierian genus *Sternoptyx*, has been anticipated by that of *Argyropelicus*, previously assigned to a Mediterranean species by the Italian naturalist Cocco, and adopted in the 'Fauna Italica' by the Prince of Canino.

I have now succeeded in obtaining both the Cuvierian species of *Sternoptyx* in this part of the Atlantic; though *St. diaphana* (Le St. d'Herman, Cuv.) cannot, like *Arg. Olfersii*, be perhaps fairly claimed at present to belong to the Madeiran fauna §.

The Atlantic and Mediterranean species of *Argyropelicus* may be thus distinguished:

- ARG. OLFERSII, CUV. *Corpore altiore, altitudine dimidium longitudinis (dempta pinna caudali) superante; parte postica (caudali) abbreviata; capite duplo altiore quam longo; sterno*

* Proc. Zool. Soc., June 1843, part 11. p. 81.

† *Ibid.* part 13. p. 103.

‡ Fishes of Madeira, Preface, p. xii.

§ Proc. Zool. Soc. part 11. p. 85.

postice in forcipem, præoperculo inferne in aculeum simplicem desinente. (St. Olfersii, Cuv. l. c.)

ARG. HEMIGYMNUS, Cocco. *Corpore angustiore, altitudine dimidium longitudinis (dempta pinna caudali) æquante; parte postica (caudali) elongata; capitis longitudine altitudinem æquante; sterno postice in angulum simplex acutum, præoperculo inferne in aculeos duos desinente.* (Arg. hemigymnus v. Sternoptyx mediterranea, Cocco et Buon. Faun. Ital. cum fig.)

This extraordinary group of fishes offers many points of analogy with *Berycidae*.

Fam. LICHIIDÆ.

3. TEMNODON VADIGO. (*Lichia vadigo*, Cuv. et Val. viii. 363. t. 235.)

A single example was taken in February 1846, but it appeared to be quite unknown to the fishermen, and is therefore to be regarded as a mere straggler in these seas.

If the genus *Temnodon* be retained, this fish has precisely the same claims to a place in it as the common "Anchova" of Madeira (*T. saltator*, Cuv. et Val.).

Fam. SCOMBRIDÆ.

4. SCOMBER COLIAS (Gm.), Cuv. et Val. viii. 39. t. 209. (*The Spanish Mackerel*, Yarr. Brit. Fish. i. 131.)

In April 1844, the market in Funchal was plentifully supplied with these fishes for two or three successive days. They were said to have been brought from Porto Santo.

5. AUXIS VULGARIS, Cuv. et Val. viii. 139. t. 216.

A single example, February 3, 1845. Not quite unknown to the fishermen, but its occurrence said to be a mere chance.

6. PELAMYS SARDA, Cuv. et Val. viii. 149. t. 217.

October 27, 1844: a single example, called "Sarda" by the fishermen, to whom it is not absolutely unknown, though, like the last, of merely casual occurrence.

Fam. TÆNIOIDÆ.

7. TRACHYPTERUS GRYPHURUS. *Corpore elongato, macula posteriore laterali spatium tertiam partem totius longitudinis æquante a basi pinnae caudalis amota; pinnarum radiis scabris; linea laterali inermi, postice supra marginem ventralem desinente.*

D. 5 + 166; P. 10 v. 11; V. 1 + 5; A. 0; C. $\frac{VIII.}{5}$; M. B. 6.

Intermediate between *T. falx* and *T. iris* of Cuvier and Valenciennes' 'Histoire,' vol. x. pp. 333, 341; approaching, perhaps, nearest to the latter, but differing in its deeper shape ($D = \frac{L}{5\frac{1}{4}}$, instead

of $\frac{L}{9 \text{ or } 10}$), and in the backward position of the third dark side-spot. The ventral fins are short, only equalling one-twelfth of the body without the caudal fin, and the four first produced rays of the first dorsal are equal in length to the ventral fins. The lateral line ends as in MM. Cuvier and Valenciennes' figure (t. 297) of *T. iris*, but is quite unarmed. The ventral line is serrulate, and the whole surface, particularly towards the ventral line, is finely shagreened or granulate; the granulations becoming stronger towards the ventral line, as in the same figure.

In shape and proportions it agrees better with *T. falx*, but differs in several important particulars from MM. Cuvier and Valenciennes' description of that fish.

The only individual examined of this beautiful and extraordinary fish occurred in June 1845, and has been added by me to the collection of the Cambridge Philosophical Society. It was scarcely quite dead when I first saw it, and was in the most perfect state of preservation. Another *Trachypterus* had occurred in June 1844, and was probably the same species; but the example was unfortunately thrown away by the person to whom it had been mis-sent without my seeing it. It was said to have been about three feet long.

The whole body is pure bright silver, appearing as if frosted from the fine granulations of the surface. The fins are of a delicate scarlet or vermillion, the lower point or angle of the caudal being tipped, and the hinder end of the dorsal edged with black. On the sides are three blackish oval or elliptic spots. This example was twenty-five inches long, exclusive of the caudal fin, which resembles a bat's or griffin's wing, and is erected in a fan-like manner; the lower lobe or portion being suppressed or undeveloped, and only indicated by the presence of five short spinules or abortive rays.

Fam. LABRIDÆ.

8. *LABRUS LARVATUS*. *Flavus, capite humerisque griseo-nigrescente larvatis; pinna dorsali antice caudaque utrinque infra lineam lateralem rectiusculam unimaculatis; corpore oblongo elongato; dentibus validis crebris, antice biserialis; pinna caudalis apicibus analisque ventraliumque margine cœruleo-nigris.*

D. 17 + 13; A. 3 + 11; P. 16; V. 1 + 5; C. $\frac{3 \text{ v. } 4 + \text{VI.}}{2 \text{ v. } 3 + \text{V.}}$; B. M. 5;

Squamæ lin. lat. 42—45.

In general appearance, shape, and the peculiar straightness of the lateral line, this fine species much resembles *Cossyphus Darwini*, Jen.; but it is a true *Labrus*, with the dorsal and anal fins naked, and the preopercle quite entire. Its nearest allies are therefore *L. mixtus* and *L. Scrofa*; from which however, besides other characters, the numerous strong teeth distinguish it. A single example only has occurred, measuring seventeen inches and a quarter in length.

Fam. CHEIRONECTIDÆ.

Gen. CHAUNAX, Lowe.

Gen. Char. Corpus subcubico-oblongum, sufflabile, nudum, cute præsertim ad ilia ventremque flaccidissima laxa; antice obesum, postice abrupte attenuatum subcompressum. Caput osseum magnum subtetrahedrum, superne nuchaque latum planatum, utrinque s. ad genas declivè; oculis lateralibus, spatio interoculari convexo; ore rictuque amplissimis transversis plagio-plateis s. depressis. Dentes intermaxillares vomerinique palatinique parvi scobinati. Nares simplices (nec pedicellatæ nec tubulosæ). Spiracula (foramina branchialia) postica s. ad ilia pone pinnarum pectoralium axillas. Pinna dorsalis unica; pectoralibus (pedicellatis) carnosis; ventralibus jugularibus spathulatis carnosis; analis postica; caudalis simplex truncata. Cirri, præter unicum in fossula internasali, nulli.

9. CHAUNAX PICTUS, Lowe in Trans. Zool. Soc. iii. part 4. p. 340. t. 51.

D. 11; A. 5; P. 11; V. 4; C. $\frac{1+IV}{2+II}$.

Species adhuc unica. *Hab.* in mari Maderensi.

I have nothing to add to the full account of this curious fish above referred to, except by way of correction to the second paragraph in p. 344, which has been erroneously printed, and should stand thus:

“Whilst *Cheironectes* seems its most natural, *Halieutæa* is its nearest technical ally. Agreeing with *Lophius* in the wide transverse mouth, and in the backward position of the breathing orifices in the flanks, but with *Cheironectes* more in shape, in the granular or velvety roughness of the skin, and in colour; it differs from both, and approaches *Halieutæa*, in the absence of crests or cilia on the back, and in the single dorsal fin. In these last two points, and in the roughness of the skin, it agrees with *Halieutæa*, but differs in its *Diodon*-like shape, and in the position of the breathing-holes considerably behind, instead of above or before, the axils of the pectoral fins.”

Fam. SCOPELIDÆ.

Gen. PHÆNODON.

Gen. Char. Caput magnum compressum, oculis magnis, rostro brevissimo obtuso, rictu magno pone oculos longe diducto, mento subtus ad symphysin cirro barbato. Dentes intermaxillares uniseriati; anteriores (5 v. 6 utrinque) validi tenues prælongi laniarii subrecurvi remoti distincti, extrorsum supra labia inicem claudentes; ossibus palati dentibus minoribus uniseriatis, lingua biseriatis, armatis. Opercula simplicia plana. Corpus elongatum compressum nudum? s. exsquameum; abdomine punctis argenteis (ut in SCOPELO) seriatis. Linea lateralis recta pinnæque fere ut in SCOPELO, pectoralibus brevioribus.

10. PHÆNODON RINGENS. (*Scopelus barbatus*, nob. MS. olim.)

1^{ma} D. 16; 2^{da} D. 0; A. 16; V. 7; P. 9; C. $\frac{9 + \text{I.} + \text{IX.}}{6 + \text{I.} + \text{VIII.}}$; M. B. ?

Closely allied to *Scopelus*, but with the head and teeth of *Echiostoma*, which it also resembles in its single cartilaginous beard or barbule.

A single example occurred in May 1845, and was placed by me in the collection of the Cambridge Philosophical Society, under the MS. name of *Scopelus barbatus*. It was seven inches long, and the above fin-formula is taken from it.

I have been favoured by the Duc de Leuchtenberg this winter with the opportunity of examining a second individual, procured from a fisherman. It agreed in all important details with the former, but was only from five to six inches long, and had a much shorter barbule.

Both these examples were entirely devoid of scales, but from certain appearances I am inclined to attribute this defect to injury.

The colour is a uniform brownish or coal-black, except the silver pits, which are disposed in rows along the throat and belly, exactly as in *Scopelus*.

11. SCOPELUS MADERENSIS (Suppl. in Trans. Zool. Soc. iii. part 1. p. 14).

Appears to be distinguished from *Sc. Humboldti* by the forwarder (medio-dorsal) position of its first dorsal fin, and by the long pectoral fins, which are contained from four to four and a half times in the whole length, and reach to the end of the base of the first dorsal fin. The anal fin has fourteen rays.

Examples have occurred of two other forms or species, with shorter pectoral fins, in one of which the anal fin has fourteen, and in the other twenty-two rays. In the first of these, the length of the pectoral fin is one-sixth of the whole length of the fish ($P = \frac{L}{6}$); in the second it is one-fifth and four-sevenths of the same ($P = \frac{L}{5\frac{4}{7}}$); *i. e.* rather longer. But further investigations will be requisite before these can be safely proposed as species. In general habit, colour, and appearance, they agree with *S. maderensis*.

12. METOPIAS TYPHLOPS (Proc. Zool. Soc. 1843, vol. xi. p. 90).

Another example has occurred of this most curious and anomalous little fish. It was brought to me in May 1849, from the same place, Magdalena, at which I obtained the former. It is of much larger size, measuring three inches and a half in length. I find nothing whatever to correct in the account above referred to, except that the maxillary teeth, instead of being "uniseriate," are in a scobinate or brush-like band in both jaws; narrow in the upper, broader in the lower jaw.

The acquisition of a second example, confirming the peculiar characters before set down, is the more satisfactory, from the former

having been unfortunately destroyed by the wasting of the alcohol in which it was kept.

Fam. GADIDÆ.

13. *PHYCIS FURCATUS*, Flem. (not Bowdich); Yarr. Brit. Fish. ed. 1. ii. 201. (*Le Merlus barbu*, Duham. Cuv. R. An. ed. 2. ii. p. 335.)

A single example occurred May 8, 1845; not quite agreeing with the figure in the 'British Fishes,' yet certainly distinct from the common "Abrotea" of Madeira (*P. mediterraneus*, Lar.), of which, on the other hand, the *P. furcatus* of Bowdich (Excurs. p. 122. f. 28) was unquestionably a mere accidentally fork-tailed individual.

Fam. ECHENEIDÆ.

14. *ECHENEIS VITTATA*, Suppl. to Synops. in Trans. Zool. Soc. vol. iii. part 1. p. 17, and Hist. Fish. Mad. p. 77. t. 11.

The acquisition of an adult example measuring 2 feet 6½ inches in length, has proved the fish above described to have been a young individual of *E. vittata*, Rüppell (Neu. Wirbel. p. 82). It is fortunate that the happy coincidence of name necessitates no change or confusion in rendering justice to my learned friend's prior claim in the establishment of this well-marked species. The lateral dark band or *vitta* becomes indistinct in adult individuals. In the large full-grown example above mentioned it had disappeared entirely.

Fam. MURÆNIDÆ.

Gen. LEPTORHYNCHUS, *nob.*

Gen. Char. Caput scolopaciforme, callo elongato distinctum; maxillis in rostrum tenue productis, utraque dentibus minutissimis limæ instar scabra; rictu pone oculos diducto. Nares oculis contiguæ approximatae, simplices nec tentaculatae. Oculi magni. Corpus nudum anguilliforme compressum, gracile, elongatum; postice longissime attenuato-productum filiforme, apice acuto. Aperturæ branchiales sat magnæ, ante pinnas pectorales oblique deorsum fissæ. Pinnæ pectorales distinctæ lanceolatae, sat magnæ; pinna dorsali ad nucham paullo ante, anali ad gulam paullo post pinnas pectorales incipiente; utraque usque ad apicem caudæ continuata, membranacea, nec cute cooperta, sed radiis sat validis distinctis.

15. *LEPTORHYNCHUS LEUCHTENBERGI*. (*The Snipe-Eel*.)

I am indebted for an opportunity of describing this interesting new type of *Murænida* to the favour of His Imperial Highness the Duc de Leuchtenberg, to whom an example was brought by a fisherman in January last. It approaches the *Anguillidæ* by its well-developed pectoral fins. The prolonged beak-like muzzle also reminds one of that of *Leptognathus*, Swainson. The unique individual examined, which measured 2 feet 9 inches in length, scarcely half an inch in height, and four lines in thickness, is included in the extensive col-

lections formed with so much scientific ardour and discrimination by His Imperial Highness the Duc de Leuchtenberg, during his late six months' residence in Madeira.

Fam. BALISTIDÆ.

16. *MONACANTHUS AURIGA*. *Hispidus, cauda utrinque dense hispido-villosa; pallide olivaceo-murinus, sublutescens, fuscolutoso-maculatus v. interrupte longitudinaliter subfasciatus; fasciis luteis inconspicuis evanescentibus 3 v. 4 ab oculis antice oblique radiantibus; radiis 1 v. 2 anticis dorsalis primæ aliquando in filamentum productis.*

1^{ma} D. 1; 2^{da} D. 31; A. 30 v. 31; P. 13 v. 14; C. 1 + X. + 1.

From eight to ten or eleven inches long. On each side, towards the base of the caudal fin, is an oblong patch, like plush or velveteen, of close thickset hairs or bristles. The occasional production of the second or first two rays of the second dorsal fin is perhaps sexual. Such examples have the muzzle rather longer and more produced before the eyes than those which have not the elongated dorsal filament. They are perhaps the *M. filamentosus* of M. Valenciennes, to whose figure and description, however, in M.M. Webb and Berthelot's 'Canarian Fishes,' I regret I have not access.

Several examples have occurred, chiefly in the autumn, during the last five or six years, of this previously in Madeira unobserved or unrecorded species.

SQUALIDÆ.

Fam. ALOPECIDÆ.

17. *ALOPIAS VULPES*, Buon. (*The Fox Shark*, Yarr. ii. 379.)

An example occurred this spring of unusual size, measuring eighteen feet in length, of which the tail was ten feet. The skin was preserved by the Duc de Leuchtenberg.

Fam. SPINACIDÆ.

18. *CENTROPHORUS SQUAMOSUS*, Müll. und Henle, p. 90, with a figure.

The *Ramudo* or *Raimudo* of Madeira, not unfrequently taken off the Dezertas at a depth of twelve or fourteen "*linhas*," i. e. from 350 to 400 fathoms, belongs apparently to the above species, the habitat of which was unknown to its describers, M.M. Müller and Henle. I have only examined female examples, and the fishermen profess themselves to be entirely unacquainted with the male, which I have however formerly (March 10, 1838) once seen, though without opportunity for a close or accurate examination, and so perhaps without remarking any spine near the tips of the claspers or ventral fin-appendages. The individuals examined were five or six feet long, but the fish is said to grow to a much larger size.

Madeira, May 25, 1850.

December 10, 1850.

Prof. Owen, V.P., F.R.S., in the Chair.

The following papers were read :—

1. DESCRIPTION OF SEVERAL NEW SPECIES OF ENTOMOSTRACA.
BY W. BAIRD, M.D., F.L.S. ETC.

(Annulosa, Pl. XVII. XVIII.)

Legion BRANCHIOPODA.

Order PHYLLOPODA.

Family APODIDÆ.

Genus LEPIDURUS, Leach.

1. LEPIDURUS VIRIDIS, Baird. (Pl. XVII. f. 1.)

Body of animal, including the flap of tail segment, about two inches long and one broad. The carapace and whole body are of a fine green colour, the carapace covering about two-thirds of the abdomen; the edges of the notch in the posterior part of carapace are strongly toothed, and those of the inferior half of the carapace are very finely serrated; these teeth are of two sets, the one much larger than the others; the larger teeth are of a green colour, tipped at the point with dark brown; they are about eleven in number, and between each there are two or three much smaller ones interspersed. The appendages of the first pair of feet are very short and small, scarcely extending beyond the edge of the carapace. The segments of the abdomen are each studded with a row of stout, slightly curved spines of a green colour tipped at their edges with dark brown. The tail flap is oval, keeled down the centre, the keel being beset with short sharp spines, and the edges of the flap are finely serrated. The long setæ of the tail are nearly the length of the whole animal, and are covered with short hairs.

Hab. Van Diemen's Land. British Museum.

Legion LOPHYROPODA.

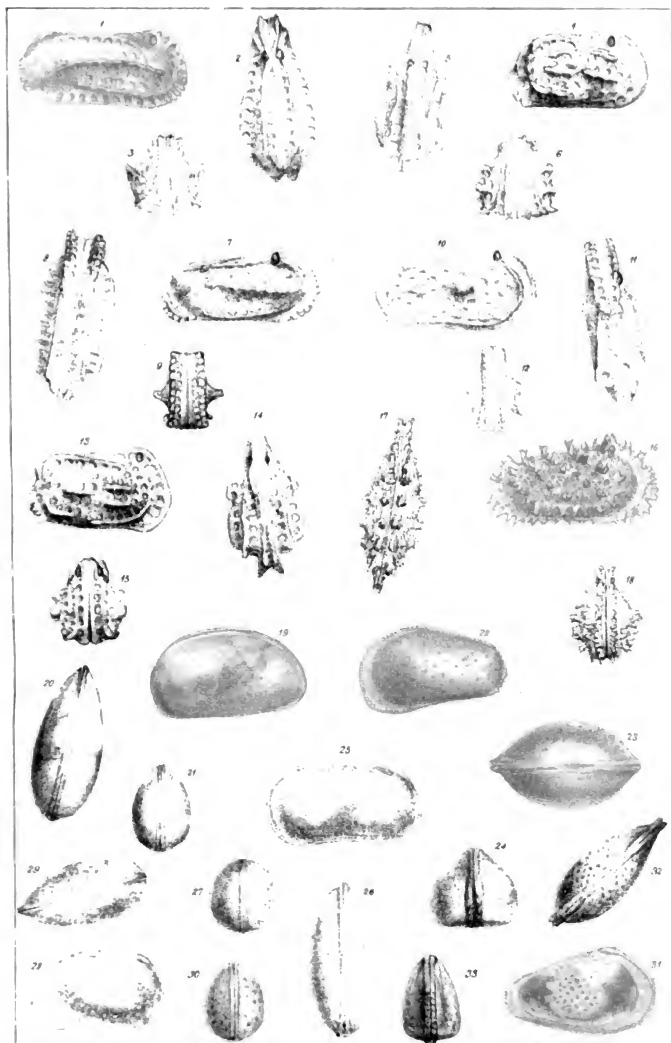
Order OSTRACODA.

Family CYPRIDIDÆ.

Genus CYPRIS, Müller.

1. CYPRIS DONNETII, Baird. (Pl. XVIII. f. 19-21.)

Carapace valves elongate oval. Anterior extremity narrower than posterior, and considerably flatter; posterior extremity rounded and very convex; dorsal edge arched; ventral slightly reniform. The surface of the valves is smooth and shining, of a brown colour, varie-



W. Wang del. et lith.

Ford & West Lithographers 54, Nassau, Garden

1,2,3 CYTHEREIS PISTULOSA 4,5,6 CYTHEREIS DEFORMIS
 7,8,9 CYTHEREIS RUNCINATA 10,11,12 CYTHEREIS AUSTRALIS
 13,14,15 CYTHEREIS PRAVA 16,17,18 CYTHEREIS SENTICOSA
 19,20,21 CYPRIS DONNETII 22,23,24 CYPRIS CUNEATA
 25,26,27 CANDONA LACTEA 28,29,30 CYTHERE SETOSA 31,32,33, CYTHERE TAREL

gated with patches of a darker shade. The pediform antennæ are provided with about six bristles of considerable length.

Hab. Freshwater ponds, Coquimbo; collected by — Donnet, Esq., Surgeon R.N. Brit. Mus.; from the collection of H. Cuming, Esq.

2. CYPRIS CUNEATA, Baird. (Pl. XVIII. f. 22-24.)

Carapace valves wedge-shaped, much broader at anterior than posterior extremity. Dorsal margin highly arched; ventral deeply sinuated in the centre, giving the shell a reniform appearance. Valves very convex in the centre, and surrounded by a prominent margin, which at the anterior extremity, when highly magnified, is seen to be minutely and finely serrated. The whole carapace is of a deep green colour, and covered with fine hairs.

Hab. Duddingston Loch, near Edinburgh; August 1850.

Genus CANDONA, Baird.

1. CANDONA LACTEA, Baird. (Pl. XVIII. f. 25-27.)

Carapace valves oblong ovate, convex. Dorsal margin nearly straight; ventral slightly sinuated in the centre. Anterior and posterior extremities of nearly equal size. Surface of valves smooth and shining, and of a dull white colour.

This species resembles in shape the *Candona reptans*, but is only about one-fourth the size, and is of a uniform dull white colour.

Hab. Freshwater pond at Charing, Kent; collected by W. Harris, Esq., to whom I am indebted for specimens. Regent's Park (*T. Rupert Jones, Esq.*).

Genus CYTHERE, Müller.

1. CYTHERE TARENTINA, Baird. (Pl. XVIII. f. 31-33.)

Carapace valves obovate. Anterior extremity much broader than posterior, and having a broad flat margin striated on the surface and toothed round the edge; posterior extremity pointed, having the same margin, but not so broad, and with much fewer teeth. The valves are very convex in the middle, of a greyish colour, with a white patch in the centre, and are slightly pitted all over. Dorsal and ventral margins both somewhat prominent.

Hab. Tarentum. In Mr. Williamson's collection.

2. CYTHERE SETOSA, Baird. (Pl. XVIII. f. 28-30.)

Carapace valves oval. Anterior extremity narrower than posterior. Dorsal margin arched; ventral sinuated about its anterior third. Surface of valves shining white, and studded all over with short stiff hairs.

Hab. Moreton Bay, Australia, and Tenedos. Mr. Williamson's collection.

Genus CYTHEREIS, Jones.

1. CYTHEREIS AUSTRALIS, Baird. (Pl. XVIII. f. 10-12.)

Carapace valves somewhat quadrilateral. Dorsal and ventral mar-

gins nearly straight. Anterior extremity broader than posterior, and finely toothed; teeth numerous. Posterior extremity emarginate on upper or dorsal edge, and toothed on ventral; teeth few, and stronger than those on anterior margin. Surface of valves roughened with small asperities, and having one tubercle on about the anterior third of its length. A raised margin encircles the whole valve.

Approaches very near *Cypridina hieroglyphica* of Bosquet, Entomost. Maestricht, t. 3. f. 4.

Hab. Moreton Bay, Australia. Mr. Williamson's collection.

2. CYTHEREIS RUNCINATA, Baird. (Pl. XVIII. f. 7-9.)

Carapace valves ovate, flat. Anterior extremity broader than posterior, and rounded; posterior extremity emarginate on upper or dorsal margin. Surface of valves very flat and rugose; a flat projecting border surrounds each valve, which is serrulated at anterior extremity and toothed on posterior; a high raised sharp ridge runs across the centre of the valve somewhat in a diagonal direction, which is serrulated along its whole length, and a smaller similar ridge is seen near the ventral margin.

Hab. Tenedos. Mr. Williamson's collection.

3. CYTHEREIS FISTULOSA, Baird. (Pl. XVIII. f. 1-3.)

Carapace valves nearly quadrilateral, elongate. Anterior extremity a little more rounded than posterior, and armed with seven or eight small teeth; posterior extremity armed with five or six larger teeth. Dorsal and ventral margins nearly straight. Surface of valves granular and ornamented by four elevated straight ridges, which are perforated near their margins with small round holes.

Hab. Manilla. Mr. Williamson's collection.

4. CYTHEREIS PRAVA, Baird. (Pl. XVIII. f. 13-15.)

Carapace valves subquadrangular. Anterior extremity considerably broader than posterior, rounded, smooth round the edge, and having a broad flat margin beset on inner edge with small round tubercles; posterior extremity emarginate, and furnished on inferior half with several short teeth. Valves extremely gibbous in centre, and the surface very rough, wrinkled, and tubercled.

Hab. Tenedos. Mr. Williamson's collection.

5. CYTHEREIS DEFORMIS, Baird. (Pl. XVIII. f. 4-6.)

Carapace valves ovate, short and gibbous; the two extremities of nearly the same size. Dorsal and ventral margins nearly straight. Surface of valves very coarsely granulated and tubercled; roughly ridged, but the ridges not perforated as in the preceding species.

Hab. Manilla. Mr. Williamson's collection.

6. CYTHEREIS SENTICOSA, Baird. (Pl. XVIII. f. 16-18.)

Carapace valves flat, ovate. Anterior extremity broader than posterior, and rounded. Dorsal margin sloping towards posterior extre-

mity; ventral nearly straight. The surface of the valves is very rough, wrinkled, and beset all over, but especially near the margins, with strong spinous laciniae.

Hab. Tenedos. Mr. Williamson's collection.

Genus CYPRIDINA, M.-Edwards.

1. CYPRIDINA ZEALANICA, Baird. (Pl. XVII. f. 11-13.)

Carapace valves of an oval form, somewhat flattened, but convex in the centre and striated; the striae are numerous, close-set, and of a waved appearance. Surface of valves covered with minute punctations, which probably give origin in the fresh state to short hairs, though they are not visible in the dried specimens. The anterior extremity is slightly narrower than posterior. The whole carapace is of a uniform white colour. Natural size one-fourth of an inch long and one-fifth of an inch broad.

Hab. New Zealand. Two specimens were sent to the British Museum by the Rev. R. Taylor, of Waimati in New Zealand, along with a collection of marine and freshwater shells, but without any history attached to them.

2. CYPRIDINA INTERPUNCTA, Baird. (Pl. XVII. f. 8-10.)

Carapace valves oval. Anterior extremity narrower than posterior; the notch near anterior extremity very wide, and its anterior margin blunt and projecting in form of a beak straight upwards; posterior extremity obtusely rounded, and terminating near the ventral margin in a short blunt point. Dorsal and ventral margins nearly straight or slightly arched. The surface of the valves is of a dull white colour, and is densely and rather coarsely covered with impressed punctations.

The carapace is convex, but much less so than in *C. M'Andrei*, and is of a much more oval shape.

Hab. Near the Isle of Skye; collected by R. M'Andrew, Esq., August 1850.

3. CYPRIDINA MARIE, Baird. (Pl. XVII. f. 5-7.)

Carapace valves elongate oval, of exactly the same size at each extremity; extremities rounded. Dorsal and ventral margins nearly plane, or very slightly arched. Surface of valves of a white shining colour, mottled with a few spots of a dull white, and covered with minute superficial punctations. Notch or ventral margin of anterior extremity blunt, leaving the upper and lower margins of the notch very obtuse.

Approaches *Asterope elliptica* of Philippi somewhat in figure of carapace, but is much more elongate, and is one-third larger.

Hab. Off the Isle of Skye; collected by R. M'Andrew, Esq., August 1850.

Pl. XVII. f. 2-4. *Estheria Dahalacensis*. Vide Proc. Zool. Soc. 1849, p. 89. No. 5.

NO. CCXVII.—PROCEEDINGS OF THE ZOOLOGICAL SOCIETY.

2. OBSERVATIONS ON THE DESTRUCTIVE SPECIES OF DIPTEROUS INSECTS KNOWN IN AFRICA UNDER THE NAMES OF THE TSETSE, ZIMB, AND TSALTSALYA, AND ON THEIR SUPPOSED CONNEXION WITH THE FOURTH PLAGUE OF EGYPT. BY J. O. WESTWOOD, F.L.S., PRES. ENT. SOC. ETC.

(Annulosa, Pl. XIX.)

The species of insects which attack the larger of our domestic quadrupeds may be divided into two chief classes; first, those which do so in order to obtain a supply of food for their own support; and second, those which do so with the object of depositing their eggs in such a position, that the larvæ, when hatched from them, will be certain of finding a proper supply of food derived from some part of the animal, either external or internal.

The insects composing the first of these two classes require for the performance of their dreaded functions an organization of the parts of the mouth especially fitting them to pierce the skins and hides of the quadrupeds upon the blood of which they subsist, and we accordingly find that it is precisely these insects which have the mouth-organs most fully developed in the different families to which they respectively belong. The *Stomoxys calcitrans*, and especially the different species of *Tabanus*, are pre-eminent in this respect; and the formidable array of lancets in the mouth of one of the latter insects is not to be met with elsewhere among the whole of the flies composing the order Diptera, to which they belong. The effects of the attacks of these insects upon the horse are perceived by the drops of blood which flow from the orifices caused by their bites, and sometimes these wounds are so numerous, that the beasts "are all in a gore of blood." A still smaller species, named by Linnæus the *Culex equinus*, also infests the horse in infinite numbers, running under the mane and amongst the hair, and piercing the skin to suck their blood. This insect, although given by Linnæus as a *Culex*, appears from his description to belong to the genus *Simulium*, to which genus also belongs an insect of fearful note, which attacks the horned cattle in Servia and the Bannat, penetrating the generative organs, nose, ears, &c. of these animals, and by its poisonous bite destroying them in a few hours. A species of the same genus of minute *Tipulidæ* is common in marshy districts in England, and I have often experienced its attacks, which have resulted in the raising of a tumour on the part of the flesh which has been attacked, attended by a considerable amount of local inflammation; and hence we may readily believe the well-authenticated effects produced upon the cattle above described. There are various other insects which attack the horse and ox, such as the *Hippoboscæ*, various species of ticks, *Anthomyiæ*, &c.; and if these do not, from their smaller size, cause a discharge of blood like the large *Tabanidæ*, it is certain that the irritation which they produce not only by their presence upon the skin, but also by the sharpness of their bite, must be very irritating to the quadrupeds which they infest.

The insects which do not themselves feed upon our cattle, but simply infest them for the purpose of depositing their eggs in some convenient place or other upon their bodies, are in no instance that I recollect provided with an increased development of the mouth organs; on the contrary, the *Cestridæ* are either entirely destitute of a mouth, or have only very small rudiments of some of the ordinary parts of the mouth, so as to be entirely unfitted for biting or wounding cattle. The effects however which some of these species produce are as annoying as those caused by the bites of the *Tabani*. The female fly of the common horse bot, *Cestrus Equi*, it is true, instils no dread into the horse round which she is intently engaged in flying, depositing her eggs here and there in particular spots where the horse is certain to lick the hairs, by which means the eggs are introduced into the mouth and pass into the stomach. So little indeed is the horse affected by the presence of this insect, that I have often stood close to one round which the *Cestrus Equi* has been flying, until the latter has come within reach of my hand, when I have caught it without trouble. Another species, *Cestrus hæmorrhoidalis*, is however much more troublesome; depositing her eggs on the lips of the horse, and producing in her endeavours to effect this such an excessive titillation, as to cause great uneasiness to the horse, which tosses its head about to drive off its enemy, gallops about, and as a last resource takes refuge in some neighbouring water, where the *Cestri* never follow it. The same kind of effect is also produced in rein deer by the *Cestrus Tarandi**, and in oxen by another species of *Cestrus*, *Cest. Bovis*, respecting which however much difference of opinion has arisen. At certain seasons, the whole terrified herd, with their tails in the air, or turned upon their backs, or stiffly stretched out in the direction of the spine, gallop about the pastures, finding no rest till they also get into the water. This *Cestrus* is asserted by some writers to make a strong humming noise, and hence it has been supposed that the herd of cattle are alarmed at the noise; but this must surely be an incorrect conjecture, as the *Cestri*, if they make any hum at all, are far outstripped in this respect by many other insects which instil no dread into oxen. Neither are they alarmed in consequence of being subjected to the same kind of attack upon so sensitive a part as the lips, as is the case with the horses attacked by *Cestrus hæmorrhoidalis*. It is however asserted by some writers, that the dread is produced by the pain inflicted by the *Cestrus* in depositing her eggs, her ovipositor being represented as constructed like an auger or gimlet, only having several longer points it can wound with more effect. When it is stated, however, that the female *Cestrus Bovis* does not occupy more than a few seconds in depositing each egg, we may fairly doubt whether, with her long, fleshy, tubular ovipositor, she has been able to pierce the hide of an ox; or whether, as Mr. Bracy Clark suggests, she only

* At the present time (April 1851) some of the rein deer in the Gardens of the Society, which were imported last autumn from Lapland, are infected to a remarkable extent with the tumours of this species; there must, I think, be from fifty to a hundred tumours on one of these animals.

makes use of this long instrument to thrust the egg down to the surface of the skin, which she does not pierce, but only glues its eggs to it, the young larvæ when hatched burrowing into the flesh. If this be the case, the act of oviposition must be unattended with pain, as in the case of the deposition of the eggs of *Æstrus Equi*, and we must search for the cause of the alarm of the herd, either in an instinctive knowledge that a certain insect flying around them is the parent of a grub which at a future time will be a torment to them, or in the attacks of some other insect; and I confess that I am inclined to consider that Virgil's beautiful description of the annoyance caused by

"Myriads of insects fluttering in the gloom,
(*Æstrus* in Greece, *Anilus* named at Rome,)
Fierce and of cruel hum"—

has a *Tabanus* rather than an *Æstrus* for its origin.

The larva of the *Æstrus Equi* resides beneath the skin of the back of the ox, causing large tumours, and having the extremity of its body constantly placed at the orifice of the wound, where it was introduced as an egg, or introduced itself as a grub, the openings of its respiratory apparatus being placed at that part of the body.

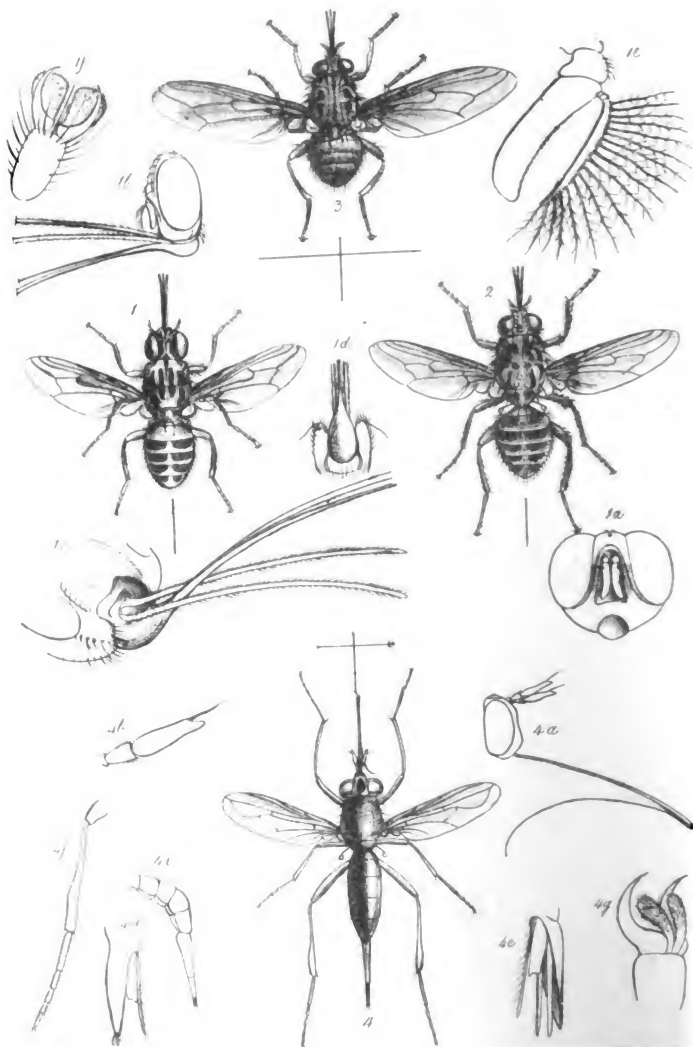
These introductory remarks on the different modes in which insects attack our horses and oxen, and the different effects which they produce, will enable us the better to estimate the effects produced by an insect, or several species of insects, of tropical Africa upon the horses of travellers who have lately returned from that part of the world, where their enterprising researches have been rewarded by the discovery of the great central lake Tchad. Captain Frank Vardon, a gentleman who has travelled far in the interior of Africa, has placed in my hands some fragments of Dipterous insects which attacked his horses, causing the death of one of them. The following is an extract from his note to me in reply to my inquiry as to the mode of its attack:—

"33 Oxford Terrace, Hyde Park, May 1850.

"DEAR SIR,—I had always heard that the fly of South Africa so destructive to cattle was a large gad-fly, the size of a bee or hornet. This is quite erroneous: it is not very much larger than the common house-fly, but a longer and more 'rakish'-looking insect, and easily distinguished by the transverse black bars on its body.

"I fancy it is not met with south of the Tropic of Capricorn. It is usually found on hills, plains being free from it. I have ridden up a hill and found the *Sêtsé* increasing at every step, till at last forty or fifty would be on my horse at once. The specimens you saw cost me one of the best in my stud. He was stung by some ten or a dozen of them, and died in twenty days. I myself have been bitten by the *Sêtsé*; you would almost fancy it was a flea biting you. Some parts of South Africa are, I should say, rendered inaccessible by the presence of this pest; I mean of course to a man who travels in the usual way, with his oxen and horses.

"How far the *Sêtsé* extends in the interior is of course as yet unknown, but I have certain information as to its being 200 miles north



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of the 'Great Lake' recently discovered by my friends, Messrs. Livingston, Oswell and Murray.

"Yours faithfully,

"FRANK VARDON."

"J. O. Westwood, Esq."

The various specimens forwarded to me by Captain Vardon have enabled me to determine that the insect is a new species of Wiedemann's genus *Glossina*, which may be thus characterized:—

GLOSSINA MORSITANS, Westw. (Pl. XIX. fig. 1. and details.)

Luteo-albida, thoracis dorso subcastaneo, griseo subtomentoso, vittis quatuor longitudinalibus in medio interruptis nigris, scutelli apice punctis duobus parvis fuscis; abdomine pallide lutescenti, segmento basali utrinque macula parva laterali nigra, singulo segmentorum quatuor proximorum ad basin fascia nigricanti, in medio interrupta, notatis; alis parum infumatis.

Long. corp. lin. 5; expans. alar. lin. $8\frac{1}{2}$.

The head is of a dirty buff colour, narrower than the thorax, with large eyes; the epistoma is paler coloured and clothed with whitish hairs; the proboscis is rather longer than the height of the head; it consists of a slender, horny seta or compound bristle, chestnut-coloured in its chief length, but dilated at the base into a large oval bulbous horny lobe, and upon maceration I was enabled to withdraw from the upper side of the seta (which is consequently grooved), two very delicate styles as long as the proboscis; the sides of this instrument are defended by a pair of elongated, slender setose palpi, as long as the proboscis itself; these are concave on the inside and blackish at the tips, and the setæ with which they are clothed are also black, as well as the branched setæ with which the arista of the antennæ is furnished; the outer surface of the arista itself, under a powerful microscope, is evidently villose. The antennæ are inserted in a depressed obconic space between the eyes, rounded above, and there are two dark spots on the upper part of the epistoma; the two basal joints of the antennæ are dark in front, and the large third joint is dirty buff-coloured. The thorax is chestnut-red, clothed with a very delicate grey tomentosity and finely punctured; it is impressed across the middle of the dorsum, and is marked with four longitudinal broad black bars, abbreviated in front and behind, the two central ones being longest in front, and the two lateral ones longest behind; the two former are united in front by a black streak from the front margin. The scutellum is dirty buff, with two dark dots at its extremity, from which, as well as from various dark dots at the sides, arise long black setæ; the halteres are nearly white. The wings are slightly stained with dusky; the veins black, except at the base of the wing, where they are dirty-buff. The legs are dirty-buff, with the outside of the thighs stained with dark brown. The last two joints of the tarsi are black, with large pulvilli. The abdomen is flat, oval in outline, and dirty fulvous buff in colour, clothed above with numerous minute

black setæ, which are greatly elongated at the base of the abdomen and the extremity and sides of each segment; the first segment is marked at each side close to the anterior angle with a round black spot, and each of the four following segments has a broad basal fascia of dark brown, interrupted in the middle. The sides and under surface of the thorax are varied with black patches; the abdomen is pale-coloured beneath, with a large terminal oval plate, down the middle of which runs a pale longitudinal line, preceded by two small oblique oval patches, thickly clothed with minute black setæ.

The peculiarities of the genus *Glossina*, whereby it is at once distinguished from *Stomoxys*, to which it is nearly allied, consist in the dilatation of the extremity of the discoidal cell, the rounded horny bulbous base of the proboscis, which is not angulated at its base, and the long and slender flattened palpi, which together form a sheath protecting the proboscis. Wiedemann's typical species (which has remained unique to the present time), *Glossina longipalpis*, (subsequently described by Robineau Desvoidy under the name of *Nemorhina palpalis*,) is a native of Sierra Leone, where it was collected by Afzelius. M. Macquart, judging from the structure of the mouth, considers it probable that it does not live upon the blood of animals, like *Stomoxys*, but upon the nectar of flowers; the two setæ which are enclosed in the proboscis and compose the sucker being so slender, that it is difficult to conceive that they can pierce the skin, the palpi being also elongated so as to form a protection to it, and thus further indicating its weakness. There is however so great a difference between the structure of the proboscis in these insects and *Stomoxys*, that I do not doubt that they are able to pierce the skin of a horse, the proboscis of *Glossina* being a long, straight, horny, needle-like instrument, and not elbowed, with fleshy lips, as is that of *Stomoxys*. Moreover, the bulbous dilated base of the proboscis must evidently play an important part in the economy of the insect, either by giving additional support to the proboscis when in the act of piercing the skin, or by containing powerful muscles for the action of the enclosed setæ; or, as suggested to me by Prof. Owen, this dilated base may be analogous to the dilated base of the sting of the Scorpion, and like it contain a reservoir of some powerfully poisonous liquid.

The account of the irritating powers of the *Glossina* given by Captain Vardon is, it is true, not so detailed as could have been desired, but we learn sufficient to arrive at the conclusion that its effects are, to a certain extent, exactly like those of the *Tabanidæ*; how far the attacks may be attended with tumours, similar to those produced by the *Simulium*, and whether a tropical climate may not extend the effects of the attack, producing inflammatory action upon animals perhaps never before in those latitudes, are questions which have yet to be answered. One thing however appears to me evident, that the Sêtsé is no other than the Zimb of Bruce, (an insect respecting whose real family and even existence so many doubts have been expressed,) or at least that that insect is a larger species of *Glossina*, to whose real habits Bruce has added those of a species of *Æstrus*. With the view of establishing this assertion, as well as of clearing up what I

consider the inconsistencies of Bruce's account, I shall beg to introduce his description of the Zimb.

"Nothing was more opposite than the manners and life of the Cushite and of his carrier the shepherd. The mountains of the Cushite and the cities he built afterwards were situated upon a loamy black earth, so that, as soon as the tropical rains began to fall, a wonderful phenomenon deprived him of his cattle. Large swarms of flies appeared wherever that loamy earth was, which made him absolutely dependent in this respect upon the shepherd; but these affected the shepherd also. This insect is called the Zimb* in modern or vulgar Arabic; it has not been described by any naturalist. It is in size very little larger than a bee, of a thicker proportion, and the wings, which are broader than those of a bee, are placed separate, like those of a fly. They are of pure gauze, without colour or spot upon them; the head is large; the upper jaw or lip is sharp, and has at the end of it a strong pointed hair of about a quarter of an inch long; the lower jaw has two of these pointed hairs, and this pencil of hairs, when joined together, makes a resistance to the finger nearly equal to that of a strong hog's bristle; its legs are serrated on the inside, and the whole covered with brown hair or down. As soon as this plague appears and its buzzing is heard, all the cattle forsake their food and run wildly about the plain till they die, worn out with fatigue, fright and hunger. No remedy remains but to leave the black earth and to hasten down to the plains of Atbara, and there they remain whilst the rains last, this cruel enemy never daring to pursue them farther.

"What enables the shepherd to perform the long and toilsome journeys across Africa is the camel, emphatically called by the Arabs the ship of the desert. Though his size is immense, like his strength, and his body covered with a thick skin defended with strong hair, yet still is he not capable to sustain the violent punctures the fly makes with his pointed proboscis. He must lose no time in removing to the sands of Atbara, for when once attacked by this fly, his body, head and legs swell out into large bosses, which break and putrefy to the certain destruction of the creature. Even the elephant and rhinoceros, who, by reason of their enormous bulk and the vast quantity of food and water they daily need, cannot shift to desert and dry places as the season may require, are obliged to roll themselves in mud or mire, which when dry coats them over like armour, and enables them to stand their ground against this winged assassin; yet I have found some of these tubercles upon almost every elephant and rhinoceros that I have seen, and *attribute them to this cause*. All the inhabitants of the sea-coast of Melinda, down to Cape Gardafan, Saba, and the south coast of the Red Sea, are obliged to put themselves in motion and change their habitation to the next sand in the beginning of the rainy season, to prevent all their stock of cattle from being destroyed.

"Of all those that have written upon these countries, the prophet Isaiah alone has given an account of this animal and the manner of

* "See Appendix. It is the same name as Zebul in Hebrew.—E."

its operation (Isaiah, vii. 18, 19): 'And it shall come to pass in that day, that the Lord shall hiss for the fly that is in the uttermost part of the rivers of Egypt . . . and they shall come, and shall rest all of them in the desolate valleys, and in the holes of the rocks, and upon all thorns, and upon all bushes.' " (Travels, ii. pp. 314-317.)

"*Tsalsalya, or Fly*.—We are obliged with the greatest surprise to acknowledge that those huge animals, the elephant, the rhinoceros, the lion and the tiger, inhabiting the same woods, are still vastly this fly's inferiors; and that the appearance of this small insect, nay, his very sound, though he is not seen, occasions more trepidation, movement and disorder, both in the human and brute creation, than whole herds of these monstrous animals collected together, though their number was in a tenfold proportion greater than it really is. Providence from the beginning it would seem had fixed its habitation to one species of soil, being a black fat earth, extraordinarily fruitful.

"We cannot read the history of the plagues which God brought upon Pharaoh by the hands of Moses, without stopping a moment to consider a singularity, a very principal one, which attended the plague of the fly. The land of Goshen, the possession of the Israelites, was a land of promise which was not tilled or sown, because it was not overflowed by the Nile. But the land overflowed by the Nile was the black earth of the Valley of Egypt, and it was here that God confined the flies.—I have magnified him about twice the natural size.—He has no sting, though he seems to me to be rather of the bee kind; but his motion is more rapid and sudden than that of the bee, and resembles that of the gad-fly in England. There is something particular in the sound or buzzing of this insect. It is a jarring noise, together with a humming, which induces me to believe that it proceeds, at least in part, from a vibration made with the three hairs at his snout.

"The Chaldee Version is content with calling this animal simply Zebub, which signifies the fly in general as we express it in English. The Arabs call it Arob in their translation, which has the same general signification. The Ethiopic translation calls it Tsal tsalya, which is the true name of this particular fly in Geez, and was the same in Hebrew. The Greeks have called this species of fly *Cynomyia*, which signifies the dog-fly; in imitation of which, those I suppose of the church of Alexandria that, after the coming of Frumentius, were correcting the Greek copy and making it conformable to the Septuagint, have called this fly Tsal tsalya Kelb, in answer to the word *Cynomyia*. Salal in the Hebrew signifies 'to buzz' or 'to hum,' and as it were alludes to the noise with which the animal terrifies the cattle; and Tsal tsalya seems to come from this by only doubling the radicals: t'Tsasalou*, in Amharic, signifies 'to pierce with violence.'"—*Appendix*, vii. 284 *et seq.*

* "The name of this fly is undoubtedly derived from a word signifying 'to buzz' in Hebrew and Ethiopic. The drawing seems to have been made from a preserved subject, an eminent naturalist (the late Prof. Walker) having observed that some of the finer parts are wanting in it. These may have been lost in keeping, or during the drawing of it at home.—EDIT."

From this account we learn that it is the sound of this insect which produces a great amount of trepidation in the cattle of Abyssinia. This accords with Bracy Clark's ideas of *Cestrus Bovis*. Bruce's description of the position of the wings clearly indicates a Dipterous insect, and his figure shows a bee-like insect, with a long straight porrected proboscis exactly like that of *Glossina*. Bruce adds, that the insect punctures the thick skin of the camel with its proboscis, the parts attacked breaking out into large bosses, which are also occasionally found upon the rhinoceros and elephant. It will be observed however that Bruce merely supposed these tumours to arise from the attack of the Zimb.

I think we have sufficient grounds for believing that Bruce has here jumbled together the notion of the buzzing of the *Cestrus* instilling dread into a herd of cattle, his knowledge of the piercing powers of the proboscis of the Sêtsé, and his knowledge of the tumours caused by the presence of the larvæ of *Cestri* under the skin of the camel*, rhinoceros and elephant. The College of Surgeons possesses a specimen of the larva of the *Cestrus* of the rhinoceros, and the camel is also subject to the attacks of a species of the same genus; whilst I consider that Bruce's figure is made up from memory, taking the statement of its resemblance to a bee and its possession of a proboscis together†. No instance, in fact, is known of a species which attacks these animals with its proboscis, forming tumours upon their backs such as are described by Bruce, which agree on the whole with the tumours caused by the larvæ of *Cestrus Bovis*; and we have already seen that no *Cestrus* is capable of inflicting a wound with the organs of the mouth, of which in fact all the known species are destitute, whilst the boring powers of their ovipositors are very questionable.

The accounts given by Mr. R. Gordon Cumming of the destructive powers of the Tsetse fully confirm the opinion here advanced, and prove that although "its bite is certain death to oxen and horses," it causes no dorsal tumours like an *Cestrus*. "This hunter's scourge," he says, "is similar to a fly in Scotland called *K'leg*‡, but a little smaller; they are very quick and active, and storm a horse like a swarm of bees, alighting on him in hundreds and drinking his blood. The animal thus bitten pines away and dies, at periods varying from a week to three months, according to the extent to which he has been bitten." "The next day one of my steeds died of the 'Tsetse.' The head and body of the poor animal swelled up in a most distressing manner before he died; his eyes were so swollen that he could

* Pliny was aware of the attacks of *Cestri* upon the camel, and he informs us that the merchants of Arabia were in the habit of anointing their camels with whale- and fish-oils. (Hist. Mund. lib. xxii. p. 302, et lib. xi. cap. 16. p. 36. edit. Pancoucke.)

† It is evident from the note added by the editor of the 8vo edition, from which the above extracts have been made, that the drawing of the insect was not a *bonâ fide* one made on the spot, but was manufactured at home.

‡ *K'leg* is the local name for the *Hæmatopota pluvialis*.

not see, and in darkness he weighed for his comrades who stood feeding beside him *."

The Marquis di Spineto, in a memoir published "On the Zimb of Bruce as connected with the Hieroglyphics of Egypt†," endeavoured to ascertain the characters of this insect, and came to the conclusion that it belongs to the order Diptera, notwithstanding Bruce says that it very much resembles the Bee genus, and that it has "several of the properties of the *Bombylius*, the *Tabanus*, the *Cestrus*, and the *Hippobosca*, without belonging to any of them. In some of its generic and even specific characters it is like the *Bombylius* and *Cestrus*, in others like the *Hippobosca* and the *Muscidæ*, in a few like the *Tabanus* and the Dog-fly, whilst in the aggregate it differs from every one of these insects." The Marquis points out the various relationships which the insect, as described by Bruce, presents to these different genera, considering that the porrected hairs or bristles forming the mouth "perform the office of suckers, simply because it does not lay its eggs in the flesh of animals; for according to the account which Bruce gives of the evils attending the attacks of this fly, the bosses which are produced swell, break and putrefy, but never exhibit any larvæ or maggots," thus differing from the habits of the *Cestri*; to which however he adds, by some curious misconception, that "*the larvæ of the Cestrus live in wood, which does not seem to be the case with the Zimb.*"

The Marquis however identifies the Zimb with the *Kvróvua* or 'Dog-fly' of the Greeks, the 'Tsal tsalya Kelb' of the Alexandrian Church, the 'Af an ouhor' of the ancient Egyptians, the 'Arob' or 'Oreb' of Exodus viii. 21, and the 'Cestrus' of Aristotle; and considers that it is the precise species of fly which caused the fourth of the plagues of Egypt‡. As such, he also regards it as the insect represented on the Egyptian monuments at the head of the cartouches which enclose the hieroglyphical titles of the Pharaohs, and as a symbol of Lower Egypt (where only the insect occurs), the preceding figure being intended for a sceptre, in contradiction to the opinion of M. Champollion, who regards the figure of the insect as that of a bee; and consequently the signification of the two symbols as that of "King of an obedient people." I can by no means however agree with this opinion of the Marquis Spineto, since an examination of various Egyptian monuments in the British Museum and elsewhere (in all of which the insect is represented under precisely the same form) has convinced me that it is intended to represent a Hymenopterous insect, and not one of the Diptera. It is in fact more like the figure of a common Wasp than any other ordinary insect; the

* Five Years of a Hunter's Life in the Far Interior of South Africa, ii. pp. 220, 227.

† Lond. and Edinb. Phil. Mag. 1834, vol. iv. p. 170.

‡ In the Article "Musquitoes" (Brit. Cyclop. Nat. Hist. iii. 299), I have suggested various reasons for supposing that the fourth plague of Egypt was caused by some species of *Culicidæ*, which, although not disproved, are certainly weakened by the knowledge now obtained of the real habits of the *Tsetse* or *Zimb*.

appendages of the head, which are obliquely porrected, are evidently intended for antennæ, and not for a bipartite proboscis; the wings, it is true, are only represented as two in number, but as the two on each side of the body in the Hymenoptera are hooked together, they would, by common observers, be regarded as but one; while the contracted form of the base of the abdomen is precisely that of some of the *Vespidæ* figured in the great French work upon Egypt. The *Polistes* represented in pl. 8. fig. 2 ♂. of that work indeed might almost be considered as the identical species intended to be represented on the monuments.

Mr. S. Birch indeed informs me that there is a coloured representation of this hieroglyphic figure on one of the Egyptian monuments in the British Museum, and that the banded colours of the abdomen leave no doubt that it is intended for a Wasp. Moreover the Egyptian name of this insect was the same as that of Upper Egypt, whilst the preceding figure was intended for a reed as emblematical of Lower Egypt, and consequently the two figures indicated the power of the monarch over both these parts of the empire.

To render this article more complete, I have added descriptions of two more tropical African species of *Glossina*, from the Collection of the Rev. F. W. Hope, together with that of another remarkable hitherto undescribed genus allied to *Glossina*, but distinguished by the very singular recurved proboscis and long styloferous abdomen, also from tropical Africa.

GLOSSINA TACHINOIDES, Westw. (Pl. XIX. fig. 2.)

Cinerea, faciei striga longitudinali media fulva, epistomate argenteo-sericeo, thoracis dorso brunneo-maculato, scutello griseo maculis duabus brunneis punctisque duobus minutis apicalibus nigris, abdominis dorso carneo-griseo segmento singulo maculis duabus maximis fuscis, pedibus luteo-albidis, tarsis supra nigris.

Long. corp. lin. 4; expans. alar. lin. $8\frac{1}{2}$.

Hab. in Africa occidentali tropicali. (Mus. D. Hope.)

This species is smaller than the preceding and differently coloured. The terminal joint of the antennæ is more lunate in form and dusky coloured in front; the palpi are dusky coloured at the tip and clothed with black hairs. The upper surface of the thorax is ash-coloured, divided across the middle by an impressed line; the anterior half is marked on each side towards the fore angles with an oval brown spot, extending laterally and backwards into a lunate line, enclosing a smaller oval spot on each side towards the hinder angles: in the middle are two slender abbreviated brown lines, and two minute spots resting upon the transverse impressed line over which they are extended and dilated into a pair of somewhat larger spots in the middle of the upper surface of the thorax, each with a slender transverse line extending from it to the sides of the thorax, where it meets a curved lateral brown line enclosing a fainter oval spot, the hind extremity of each of which nearly joins, at the hinder angles of the back of the thorax, a straight line running forwards into the disk, where it vanishes.

The upper side of the abdomen may be described as of a brown colour, with the lateral and posterior edges and an ill-defined longitudinal central band of fleshy ash: it is thickly clothed with minute black hairs on the disk, and with long ones at the base and sides. The wings and their veins are coloured as in *Gl. moritana*.

GLOSSINA TABANIFORMIS, Westw. (Pl. XIX. fig. 3.)

Griseo-fusca epistomate sericeo, thorace fusco-maculato, abdomine fusco-rufescenti apice sensim obfuscatō, pedibus fusco-luteis tibiis tarsisque nigro lineatis alis fusco infumatis.

Long. corp. lin. 6; expans. alar. lin. $13\frac{1}{2}$.

Hab. apud littus aureum Africæ tropicalis occidentalis. (Mus. D. Hope.)

This species is very much larger than either of the preceding. The head is comparatively much smaller and the wings much larger; the front of the head is dusky; it, as well as the basal joints of the antennæ, is rather thickly clothed with black hairs; the arista of the antennæ is luteous, with a dark line behind, and the branding setæ with which it is furnished are black; the palpi are thickly clothed externally with short black setæ; the thorax is dark greyish brown, also very thickly clothed with short black setæ and long curved lateral bristles; the back of the thorax is marked with a dark central longitudinal line, having a less distinct one on each side of it, between which and each side are two large brown spots, one behind the other; the scutellum is paler, and marked with two ill-defined dusky spots; the wings are stained brown; the legs are dirty luteous buff; the tibiæ marked with one, and the tarsi with three very delicate longitudinal black lines; the tibiæ are compressed, and the black line occupies the superior compressed ridge.

Tribe MYOPARIDÆ, Macquart, Hist. Nat. Ins. Dipt. ii. 29.

Genus STYLOMYIA, Westw. (Stylogaster, Wlk. nec Macq.)

Corpus subelongatum capite thorace parum latiori, facie antice dimidio supero carinato, dimidio infero valde concavo. Antennæ porrectæ articulo basali minimo, 2do obconico, 3tio suborali præcedentis longitudine, vel præcedenti multo longiori compresso parum curvato, arista versus apicem marginis superi inserta, porrecta. Haustellum capite et thorace conjunctim triplo longius, porrectum, in medio geniculatum, dimidio basali parum deflexo et ad ejus apicem crassiori, dimidio apicali valde incurvato. Thorax brevis quadratus. Abdomen supra subconvexum parum curvatum, apice pone segmentum 5um in stylum elongatum (longitudine quinque articulorum præcedentium æqualem), deflexum valde angustum, contracto, hujus styli apice supero in uno sexu, oblique truncato; seta elongata supra hirsuta, lobo breviori compresso filamentisque duobus elongatis simplicibus in cavitate truncata insidentibus. Alæ breves cellula 1ma postica clausa pediculata et postice dilatata, vena obliqua cellulam postice contiguam claudente sub-

obsoleta; cellula anali brevissima vix pone pseudalulam extensa vena brevissima transversa clausa. Pedes elongati gracillimi, calcaribus duobus tibiæ parum elongatis, tibiis posticis difformibus, unguibus pulvillisque minutissimis.

This genus is very close to the American genus *Stylogaster*, but especially differs from the description given thereof by M. Macquart, in the very minute condition of the anal cell of the wings. The form of the head and the unequal division of the haustellum, as represented in M. Macquart's pl. 13. fig. 15, are also characters at variance with those of the insects of which I have composed the present genus. The anal cell is of small size in *Stachynia*, Mcq. (*Dalmannia*, Rob. D.), but it is still more minute in *Stylomyia*. The long slender legs and minute claws and pulvilli are also unlike those of all the other *Myopariæ*.

STYLOMYIA LEONUM, Westw. (Pl. XIX. fig. 4, and details.)

Rufo-fulva, facie argenteo-sericea antennis rufo-fulvis arista nigra, vertice subplano macula ovali nigra ocellos postice includente, haustello nigro basi subtus parum pallidiori, thorace scutello abdomineque rufo-fulvis stylo concolori fascia lata fere apicali nigra, pedibus fulvis tarsis apice fuscis, tibiis duobus posticis dimidio basali fusco, apicali albo; tarsis nigris.

Long. corp. lin., stylo excluso, 4; expans. alar. lin. 6.

Hab. in Sierra Leona, Africæ. (In Mus. D. Hope.)

The facets of the middle portion of the inner margin of the eyes are rather larger than the posterior ones. The wings are but slightly tinged with grey, and the veins are blackish. The extremity of the anal style with its filaments are fulvous coloured. The two posterior tibiæ are very slender at the base; the apical half is dilated on the upper edge, the under edge not being quite straight.—*Note.* All the details are taken from the species figured.

STYLOMYIA CONFUSA, Westw. *Fulva, facie argentea, vertice omnino nigro; antennis fulvis articulo 3tio antennarum longitudinem 2di vix superanti, ovali-conico, arista nigra; tuberculo antennifero pallide fulvo, haustello nigro basi fulvo; thorace supra nigro marginibus lateralibus angulisque anticis distincte et irregulariter luteis setis longis nigris. Scutello fusco setis duabus longis terminalibus nigris, pedibus quatuor anticis omnino luteo-albidis tibiis apice obscuris, femoribus duobus posticis fascia angusta ante alteraque pone medium fuscis; tibiis dimidio basali fusco fascia lata media alba, tertia parte apicali fusco, tarsis fuscis; abdomine fulvo segmentis 2do—5to margine postico tenui obscuro; styli dimidio basali fulvo-rufo; apicali nigro, genitalibus exsertis fulvo-rufis; corpore subtus fulvo-albido. Præcedenti e tertia parte minor.*

Hab. —? (In Mus. Brit.)

Although in general form and proportion of its parts, especially of the terminal style of its abdomen, the specimen of this species in the British Museum agrees exactly with *St. Leonum*, yet the short third

joint of the antennæ, and the extraordinarily enlarged size of the middle facets of the inner margin of the eyes, might indicate it to be the opposite sex of the preceding. The second segment of the abdomen is furnished on each side with a small fascicle of elongated black hairs.

This species is introduced by Mr. F. Walker into his 'List of the Dipterous Insects in the Collection of the British Museum' (part iii. p. 680), under the name of *Stylogaster stylatus*; but it appears to me that it neither accords with Macquart's generic characters of *Stylogaster*, nor with the concise Fabrician specific description of *Conops stylata* (Syst. Antl. 177), nor yet with Wiedemann's more detailed observations, especially with reference to the sexual difference in the form of the antennæ (Auss. Eur. Zw. Ins. ii. 245).

DESCRIPTION OF THE FIGURES.

(ANNULOSA, PL. XIX.)

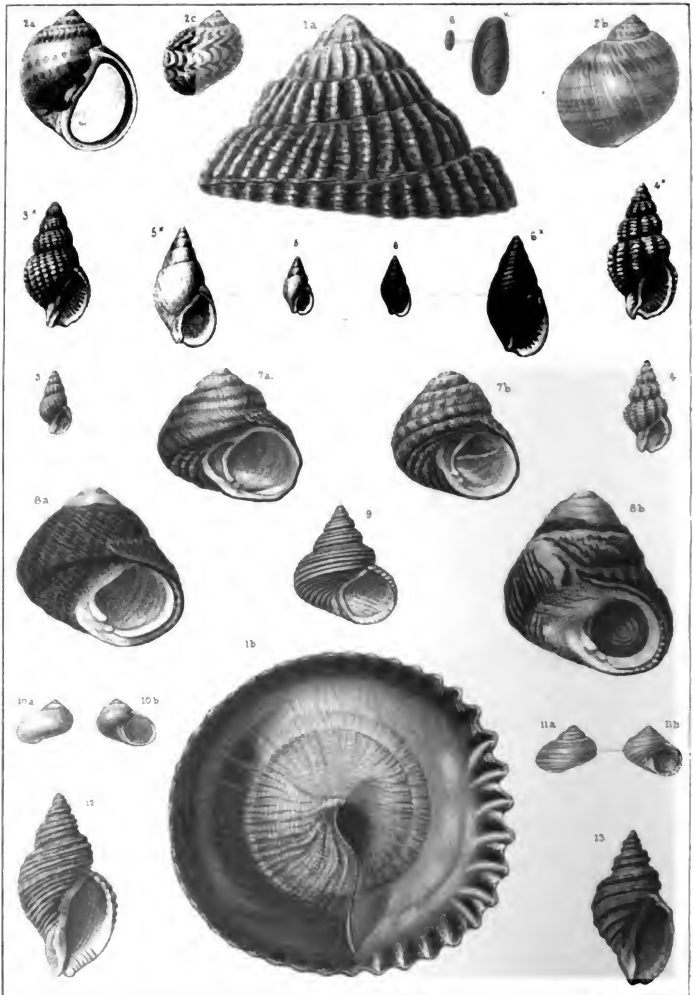
- Fig. 1. *Glossina morsitans*, magnified. 1a, the head seen in front with the haustellum removed; 1b, the head seen sideways, the tips of the parts of the haustellum removed; 1c, the lower part of the head, with the parts of the haustellum separated and the hirsute palpi removed; 1d, the underside of the extremity of the head and the bulb seen beneath, showing the bulbous base of the haustellum; 1e, antenna greatly magnified, showing the villose anterior edge of the arista and the hirsute hairs with which it is furnished; 1f, the terminal joint of the tarsus, showing the strong unguis and the large setose pulvilli.
- Fig. 2. *Glossina tachinoides* magnified.
- Fig. 3. *Glossina tabaniformis* magnified.
- Fig. 4. *Stylomyia leonum* magnified. 4a, the head and haustellum seen sideways; 4b, antenna; 4c, abdomen seen sideways; 4d and 4e, extremity of the abdomen with its appendages; 4f, hind leg; 4g, unguis and pulvilli.

3. ON THE MARINE MOLLUSCA DISCOVERED DURING THE VOYAGES OF THE HERALD AND PANDORA, BY CAPT. KELLETT, R.N., AND LIEUT. WOOD, R.N. BY PROFESSOR EDWARD FORBES, F.R.S. ETC.

(Mollusca, Pl. IX. & XI.)

Out of 307 species of shells collected by the voyagers, 217 are marine Gasteropoda, 1 is a Cephalopod, and 58 marine bivalves. The genera of which species are most numerous are—*Murex*, *Purpura*, *Trochus*, *Terebra*, *Strombus*, *Conus*, *Columbella*, *Littorina*, *Oliva*, *Cypræa*, *Natica*, *Patella*, *Chiton*, *Venus*, and *Arca*. Among the more local genera represented in this collection are, *Monoceros*, *Pseudoliva*, *Cyrtulus*, *Saxidomus*, and *Crassatella*. The specimens are usually in very fine preservation. Many of the species are rare or local.

The localities at which they were chiefly collected were the coast of southern California, from San Diego to Magdalen, and the shores of Mazatlan. Unfortunately the precise locality of many of the individual specimens had not been noted at the time, and a quantity of Polynesian shells, mingled with them, have tended to render the value of



W. H. Bailey

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Fig 1 *Trochus spirata* Forbes
 2 *Natica Pritchardi* "
 3 *Natica Woodwardi* "
 4 *N. Cooperi* "
 5 *Planaxis pigra* "
 6 *P. nigritella* "

Fig 7 *Trochus aureonectus* Forbes
 8 *T. Gallina* "
 9 *T. castaneus* Nuttall
 10 *T. Hulin* Forbes
 11 *T. purpuratus* "
 12 *Purpura analoga* "
 13 *P. fuscata* "

the collection as illustrative of distribution less exact than it might have been. A few specimens of considerable interest were taken by the 'Herald' at Cape Krusenstern. The new species are all from the American shores. There are no products of deep-sea dredging.

As many of the following new forms are from the coast of Mazatlan, Mr. Cuming, whose experience and advice has been taken, and magnificent collection consulted in drawing up this report, has considered it desirable that some undescribed shells contained in his collection, from that region, should be described and figured at the same time.

TROCHITA SPIRATA, sp. nov. (Pl. XI. fig. 1.)

T. testâ conicâ, fusco-purpureâ, longitudinaliter radiato-sulcatâ, sulcis numerosis, prominentibus, subrugosis; anfractibus 6, angustis; lamina internâ spirali, depressâ, magnâ, margine undulatâ.

Diam. $2\frac{3}{10}$, alt. $1\frac{4}{10}$ unc.

A very handsome species of this group, allied to *Calyptrea sordida* of Broderip, and differing from the well-known *T. trochiformis* in having very much narrower and more numerous whorls, as well as in its internal colouring. It was procured at Massanello, in the Gulf of California.

TROCHUS CASTANEUS. Nuttall, MSS. (Pl. XI. fig. 9.)

T. testâ latè-conicâ, crassâ, latè castaneâ, spiraliter flavo-lineatâ, anfractibus 6, convexiusculis, omnibus spiraliter sulcatis, sulcis numerosis, ultimo lato, basi subangulatâ, convexo, imperforatâ, aperturâ subquadratâ, margaritacâ, suturis impressis. Operculum?

Alt. $\frac{8}{10}$, lat. $\frac{8}{10}$, long. apert. $\frac{4}{8}$ unc.

The number of sulcations in the second whorl is about six; the cavities are always rich chestnut, the elevations yellowish. The general form is intermediate between that of *ziziphinus* and *alabastrites*. The shell has long been known under Nuttall's manuscript name, but never, so far as I am aware, described. It is from Upper California.

TROCHUS (MONODONTA) GALLINA, sp. nov. (Pl. XI. fig. 8.)

T. testâ obtusè pyramidalî, crassâ (adultus ponderosus), spirâ magnâ, anfractibus 5, glabris, obsoletè obliquè striatis, convexiusculis, albidis, fasciis angustis numerosis purpureis ornatis, anfractu ultimo prope suturam subcanaliculatâ, basi lateribus rotundatis, umbilico albo, imperforatâ, impressâ, aperturâ subquadratâ, labro externo subpatulo, margine acuto, lævi, nigrescente, labro columellari bidentato, albo, faucibus margaritaceo-albis, operculo circulari, corneo, fusco, spiris numerosissimis, confertis. Testa junior spirâ depressiusculâ.

Alt. $1\frac{1}{10}$, lat. max. $1\frac{2}{10}$, alt. apert. $0\frac{6}{10}$ unc.

Probably from the Mazatlan coast.

TROCHUS (MONODONTA) AUREO-TINCTUS, sp. nov.

(Pl. XI. fig. 7.)

T. testâ obtusè pyramidalî, crassâ, spirâ mediocri, anfractibus 4 vel

5, convexiusculis, obtusè angulatis, subcanaliculatis, spiraliter 1-2 latè sulcatis, striis spiralibus minutis, longitudinalibus minutissimis sculptis, colore nigro obscurè minutissimè que griseo-lineato, ultimo anfractu basi subplanato 4-5 sulcis profundis spiralibus sculpto, margine obtusè subangulato, umbilico profundè perforato, latè aurantio, aperturà subrotundà, labro externo tenui, nigro marginato, labro columellari albo 1-2-dentato, dentibus inaequalibus munitis, dente inferiore minimo, fauce albo-margaritaceo.

Alt. $0\frac{7}{16}$, lat. max. 1, alt. apert. $0\frac{1}{6}$ unc.

Variat costis obliquis transversis.

With the last

TROCHUS (MARGARITA) PURPURATUS, sp. nov.

(Pl. XI. fig. 11.)

T. testà turbinatà, spirà depressà, prominulà, anfractibus 5, convexiusculis, nitidis, levigatis, striis incrementi minutissimis, roseolis fasciis spiralibus latè purpureis cinctis, suturis impressis, basi margine subrotundato, umbilico imperforato, albo, aperturà subrotundà, labro externo tenui, labro interno lævi, obsoletè undulato, albo-margaritaceo, faucibus purpureo-margaritaceis.

Alt. $0\frac{1}{3}$, lat. max. $0\frac{1}{3}$, alt. apert. $0\frac{2}{16}$ unc.

A beautiful little species. W. coast of N. America?

TROCHUS (MARGARITA) HILLII, sp. nov. (Pl. XI. fig. 10.)

T. testà latè turbinatà, heliciformi, spirà obtusà, parvā, depressā, anfractibus 5 convexiusculis, levigatis, politis, ad suturas appressis, flaveo-albidis, ultimo anfractu maximo, basi convexo, marginibus rotundatis, centraliter excavato, imperforato, aperturà obliquè-subrotundā, labro externo tenui, columellari leviter arcuato, albo; faucibus albo-margaritaceis.

Alt. $0\frac{1}{3}$, lat. max. $0\frac{1}{3}$, alt. apert. $0\frac{2}{16}$ unc.

From the northern shores of the W. coast of N. America?

I have dedicated this species to — Hill, Esq., Master of the 'Herald.'

NATICA PRITCHARDI, sp. nov. (Pl. XI. fig. 2.)

N. testà subglobosā, spirā brevi, anfractibus 5, nitidis, sub lente striatis, flaveolis, fasciis transversis fusco-purpureis, angulato-undulatis flammulatis, in adulto obsoletis seu fascias obscuras spirales simulantibus; aperturā ovatā, supernè obsoletè angulatā, columellā costā callosā alba spirali in umbilicum obliquè intrante, umbilico supernè perforato; faucibus fasciato-fuscatis. Operculo calcareo, albo, lævi, polito, sulco angustissimo prope margine externo, margine interno recto, crenulato.

Alt. 1 unc.; long. anfr. ult. $\frac{2}{16}$, lat. $\frac{2}{16}$ unc.; long. apert. $\frac{1}{16}$ unc.

Mazatlan. I have dedicated this pretty shell, which reminds us of the Atlantic *intricata*, to my friend Dr. Pritchard, Assistant-Surgeon of H.M.S. Calypso, who assiduously collected on the coast of Mazatlan, where he, as well as the officers of the 'Herald' and 'Pandora,' met with this species in abundance.

Fig. 2 c. represents the young shell.

PLANAXIS NIGRITELLA, sp. nov. (Pl. XI. fig. 6.)

P. testd ovato-lanceolatd, crassiusculd, fusco-nigridd, spirâ brevi, acutd, anfractibus 6, spiraliter sulcatis, interstitiis latis, planis, sulcis in medio anfractûs ultimi obsoletis, aperturd ovatd, patuld, supernè unidentatd, labro externo tenui, marginè interno obsoletè crenulato, labro columellari, supernè striato, infernè abbreviato, lævi; canali brevissimâ, faucibus atropureis.

Long. $\frac{4}{3}$, lat. $\frac{3}{2}$, long. apert. $\frac{3}{2}$ unc.

Straits of Juan del Fuaco. The operculum is preserved in some of the numerous specimens, and has a subspiral nucleus (see fig. 6 a).

PLANAXIS PIGRA, sp. nov. (Pl. XI. fig. 5.)

P. testd ovato-lanceolatd, crassd, flaveold, spirâ mediocri, acutd, anfractibus 6, planatis, lævigatis, aperturd brevè-ovatd, patuld, supernè obsoletè unidentatd, labris incrassatis, marginibus lævibus, canali brevissimâ, faucibus albis.

Long. $\frac{4}{3}$, lat. $\frac{2}{3}$, long. apert. $\frac{2}{3}$ unc.

Its surface is invested with a soft yellow epidermis. The operculum is corneous, of subconcentric elements, with a lateral subspiral nucleus.

Pitcairn's Island.

NASSA COOPERI, sp. nov. (Pl. XI. fig. 4.)

N. testd lanceolatd, turrîtâ, crassd, anfractibus 6, convexiusculis, spiraliter sulcato-striatis, longitudinaliter 8-costatd; costis distantibus, fortibus, distinctis; anfractu ultimo $\frac{1}{2}$ longitudinis testæ equante, aperturd ovatd, canali brevi; labro externo crasso, simplici; labro columellari reflexo, albo; caudâ albd; anfractibus fuscis, obscurè albo-fasciatis.

Long. $\frac{8}{3}$ unc., lat. anfr. ult. $\frac{4}{3}$, long. apert. $\frac{3}{2}$.

Marked from the Sandwich Isles. Dedicated to Lieut. Cooper, R.N., of the 'Herald.'

NASSA WOODWARDI, sp. nov. (Pl. XI. fig. 3.)

N. testd lanceolatd, turrîtâ, crassâ, albd, rufo-fasciatâ, anfractibus sex convexiusculis, spiraliter sulcatis, longitudinaliter densè-costatis, spirâ viz longitudinem ultimi anfractûs æquante; aperturd ovatd, caudâ brevissimâ; labro columellari reflexd, albd; caudâ albd; fauce striato.

Long. $\frac{8}{3}$ unc.; lat. $\frac{2}{3}$ unc.; long. apert. $\frac{2}{3}$ unc.

With the last. Dedicated to — Woodward, Esq., R.N., Purser to the 'Herald.'

PURPURA ANALOGA, sp. nov. (Pl. XI. fig. 12.)

P. testd turrîtâ, albidâ, spiraliter latè rufo-fasciatâ; spirâ exsertâ; anfractibus 5 rotundatis, costis spiralibus (6 ad 8 in anfractu penultimo), quadratis, numerosis cinctis, interstitiis crenulatis, ad suturam obsoletis, labro subdenticulato.

Long. $1\frac{4}{5}$, lat. $\frac{8}{3}$, long. apert. $\frac{8}{3}$ unc.

This species (from the Californian coast?) bears a striking resemblance to the Atlantic *Purpura lapillus*, and is intermediate between

No. CCXVIII.—PROCEEDINGS OF THE ZOOLOGICAL SOCIETY.

it and the *Purpura decemcostata* of Middendorff, from the Icy Sea at Behring's Straits, the place of which it probably takes on the western shores of North America.

Purpura, nov. sp.? A single specimen, to which I abstain giving a name, since its characters are intermediate between those of *decemcostata* and *Freyinetii* (a Kamtschatka shell); it is probably a variety of the former.

PURPURA FUSCATA, sp. nov. (Pl. XI. fig. 13.)

P. testâ oblongâ, subturritâ, fuscâ; spirâ brevi; anfractibus convexis, costis spiralibus (2 in anfractu penultimo) paucis distantibus subsquamosis cinctis, interstitiis costis obsoletis; aperturâ dilatâtâ, columellâ albidâ.

Long. $1\frac{1}{2}$, lat. $\frac{1}{2}$, long. apert. $\frac{1}{3}$ unc.

A species of the *Lapillus* group. Said to have been taken at the Sandwich Islands.

Among the *Purpuræ* in the collection are *P. planospira*, *P. columellaris*, and *P. Carolensis*, all Galapagos species, and probably collected during the visit to those islands.

FUSUS KELLETHI, sp. nov. (Pl. IX. fig. 10.)

F. testâ crassâ, fusiformi, pyramidatâ, anfractibus 9, spiraliter striatis, angulatis, noduloso-costatis, costis in anfractibus omnibus 8, prope suturam obsoletis excavatis appressisque; anfractu ultimo $\frac{2}{3}$ testâ occupante; aperturâ elongato-pyriformi, supernè angulatâ; infernè canali obliquo plus $\frac{1}{2}$ aperturæ æquante; labro columellari, reflexo, incrassato, labro externo attenuato, subdenticulato; caudâ incrassatâ, contortâ, reflexâ; colore sordide albido, ore albo.

Long. $3\frac{1}{2}$ unc.; lat. max. anfr. ult. $1\frac{2}{5}$ unc.; long. apert. $2\frac{3}{4}$ unc.; long. caud. $\frac{2}{5}$.

This remarkable shell was taken on the Californian coast, and is very distinct from any known *Fusus*. In general aspect it closely resembles a *Fasciolaria*, reminding us strongly of the European *Fasciolaria tarentina*, but is greatly larger and has no plaits on the pillar lip. The striae which wind round the whorls are grouped in twos and threes. They become very strongly marked and assume the character of sulcations on the caudal portion of the body whorl. The ribs are mainly developed a little above the centre on the angulated portion of the body whorl and on the lower halves of the upper whorls, so prominently as to appear like large tubercles.

I have dedicated this unique shell to the eminent conductor of this important expedition.

Fusus Oregonensis was taken on the Californian coast, and *F. salebrosus* on the coast of Mazatlan.

4. ON THE GENUS *APTERYX*. BY A. D. BARTLETT.

(Aves, Pl. XXX. XXXI.)

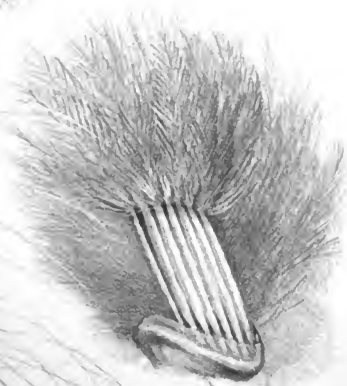
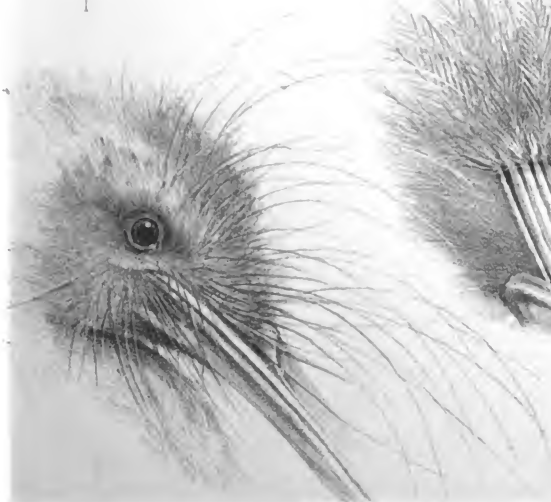
In calling the attention of the Meeting this evening to the large collection of specimens of the genus *Apteryx* on the table, I beg to state that I have been led to make a careful examination of all the



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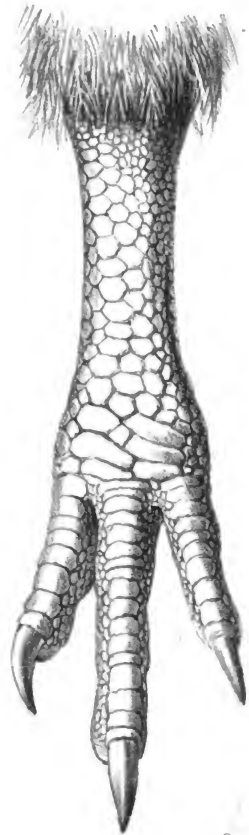
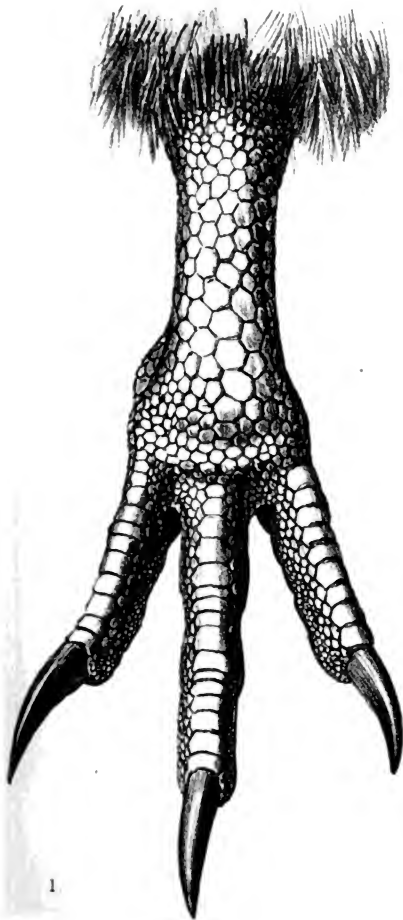
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Wolf, lith

M & N Hanhart, imp

1. 2. *APTERYX AUSTRALIS*. — 3. 4. *A. MANTELLI*.

Digitized by Google



Wolf. lith

M. & W. Hanhart, imp'

individuals I could find in the Collections of the British Museum, the Museums of the Zoological Society, the Royal College of Surgeons, and elsewhere, in consequence of an *Apteryx* belonging to Dr. Mantell having been placed in my hands by that gentleman a few days since, which appeared to me to differ from all that I had before seen. As a careful comparison of this bird with the specimens in the collections before mentioned fully justified me in considering it as a distinct species, I was about to describe it as a new one; but most fortunately, I heard that the original specimen figured and described by Dr. Shaw (to which he applied the name *Apteryx Australis*) was in the collection of the Earl of Derby at Knowsley. It is with much pleasure I have to acknowledge the kindness of his lordship in honouring me with the loan of this bird, which has enabled me to identify the large *Apteryx* placed in my hands by Dr. Mantell as belonging to this species, and also to determine most satisfactorily the distinctive characters of the common species, which is considerably smaller, and to which the name of *Apteryx Australis* has long been erroneously applied. This bird differs from the original *Apteryx Australis* of Dr. Shaw in its smaller size, its darker and more rufous colour, its *longer tarsus which is scutulated in front*, its shorter toes and claws, which are dark horn-coloured, its smaller wings, which have much stronger and thicker quills, and also in having long straggling hairs on the face. I may however remark, that although individuals of this species differ much in size, depending probably on age, sex, &c., I have found no exception to the distinctive characters above given. I therefore propose the name of *Apteryx Mantelli* for this smaller and more common species,—a humble effort to commemorate the exertions of Walter Mantell, Esq., to whom we are indebted for so many valuable discoveries in the natural history of New Zealand.

I subjoin a short description of the two species, together with figures of their legs and wings, in order that they may be more readily distinguished.

APTERYX AUSTRALIS.

Colour pale greyish-brown, darkest on the back.

Entire length 30 inches*.

Bill from forehead . . 6 „

Tarsus (reticulated) . 2½ „

Middle toe and claw 3½ „

Claws nearly equal in length, and white.

Wings with soft slender quills; face with short hairs.

APTERYX MANTELLI.

Colour dark rufous brown, darkest on the back.

Entire length 23 inches*.

Bill from forehead . . 4 „

Tarsus (scutulated) . 2¾ „

Middle toe and claw 2½ „

Middle claw longest, all the claws dark horn-colour.

Wings with strong thick quills; face with long straggling hairs.

In conclusion, I would remark that the specimen of *Apteryx Australis* belonging to Dr. Mantell was collected by his son in *Dusky*

* The entire length, being taken from skins, I consider of little value; the entire length of a bird ought always to be taken before the bird is skinned.

Bay; and I have been informed by J. E. Gray, Esq., that the original bird described by Dr. Shaw was brought from the same locality. As far as I am able to ascertain, all the specimens of *Apteryx Mantelli* are from the North Island.

5. NOTE UPON *BUCEROS GINGINIANUS*. BY LIEUT. HARDY, IN A LETTER TO COLONEL SYKES, F.R.S., F.Z.S. ETC. COMMUNICATED BY COLONEL SYKES.

MY DEAR COLONEL,—I was out shooting one day beyond Pahlunpore, when a dull slate-coloured bird, about the size and figure of a magpie, flew past me; my beaters roared out to me to fire at it, but I let it go by. They made however such a fuss about it, and had marked it down on a tree, that I went after it and to their great delight shot it. They then told me that it was very valuable to them; that they would chop up the flesh, pickle and preserve it in a bottle, and sell it as a medicine to alleviate the pangs of childbirth, for which it was highly prized. In the course of the day two sepoys came to my tent and begged to have the bird, as they had been sent out by the Mewab expressly to shoot one, but had been out two days without success. They call it "Seerōtra." None of my brother officers had ever seen or heard of it before. I kept the beak, and the other day turned it out with some other little trophies, and had it put together; if you will keep it as a little sporting tribute to my father's friend, I shall be very proud.

Sincerely yours,

EDMUND HARDY.

6. NOTE UPON *TURDUS VULPINUS*, HARTL. BY DR. HARTLAUB.

(Aves, Pl. XXXII.)

In presenting the accompanying figure of my *Turdus vulpinus*, from Caraccas, I have little to add to the description of it in the *Revue et Magasin de Zoologie*, 1849, p. 276. The only specimen I ever saw of this bird is in the Hamburg Museum. It is certainly a very aberrant species of *Turdus* and its American divisions, and would consequently justify a subgeneric separation, which however I leave to another.

7. ON NEW AUSTRALIAN BIRDS IN THE COLLECTION OF THE ZOOLOGICAL SOCIETY OF LONDON. BY JOHN GOULD, F.R.S. ETC.

(Aves, Pl. XXXIII. XXXIV.)

The first three species which I am about to describe in the present communication formed part of a collection presented to the Zoological Society of London by the late Captain Owen Stanley, R.N., whose





Wolt, lith

M & N Hanhart imp^r

MACHÆRIRHYNCHUS FLAVIVENTER *Boul*



Welf. 1846

W. & H. Hammett. Imp.

PLATE 107. ALBANY

untimely death is a real cause of regret to every one who is interested in the sciences which he cultivated with equal ardour and success.

The collection in question was remarkable for the extreme beauty of the preparations, as well as for the rarity and interest of the species of which it was chiefly composed.

MALURUS AMABILIS.

Male: Head, ear-coverts and centre of the back delicate violet-blue; lores, throat, breast, crescent across the upper part of the back and the rump deep bluish black; scapularies chestnut; wings brown, the secondaries slightly margined with white; abdomen white, very slightly tinged with buff on the flanks; tail dull greenish blue, the four lateral feathers margined externally and largely tipped with white; bill black; irides and feet dark brown.

Total length, $5\frac{1}{2}$ inches; bill, $\frac{1}{2}$; wing, 2; tail, $2\frac{3}{4}$; tarsi, $\frac{1}{2}$.

Hab. Cape York, Northern Australia.

Remark.—This species is nearly allied to *Malurus Lamberti*, *M. elegans*, and *M. pulcherrimus*, but differs from them all in having the lateral tail-feathers distinctly margined and tipped with white, and in having a lighter-coloured abdomen. I consider it to be the most beautiful species of the genus yet discovered; the only example I have seen is in the collection of this Society.

Family MUSCICAPIDÆ?

Genus MACHÆIRHYNCHUS.

Gen. Char.—Bill rather shorter than the head, very much depressed and widely dilated, causing it to assume a lancet-like form; culmen elevated, forming a distinct ridge down the centre of the upper mandible, and continued over its extremity in the form of a sharp hook; under mandible convex; tomixæ straight, the upper very slightly overlapping the lower; rictus beset with fine but stiff bristles; nostrils oblong, partly covered with an operculum, and seated in large and deep depressions occupying the basal half of the upper mandible; wings short and somewhat rounded, the first quill very short, the second much shorter than the third, the fifth the longest; tail moderate in length, distinctly graduated, the outer feather being little more than half the length of the central ones; tarsi moderate in length and slight in structure; toes feeble, particularly the anterior ones; the two outer toes equal in length, and united from the base to the first joint; hind toe rather long; claws hooked and very sharp.

MACHÆIRHYNCHUS FLAVIVENTER. (Aves, Pl. XXXIII.)

Crown of the head, lores, ear-coverts, wings and tail black, the wing-coverts tipped with white; the secondaries margined with white, and the outer tail-feathers margined on the apical portion of the external web and largely tipped with white, the white becoming less and less, until only a slight trace of it is found on the central feathers; back olive-black; throat white; line from the nostrils over each eye,

the breast, abdomen and under tail-coverts bright yellow ; bill black ; feet bluish black.

Total length, 5 inches ; bill, $\frac{4}{5}$; wing, 2 ; tail, $2\frac{1}{4}$; tarsi, $\frac{1}{2}$.

Hab. Cape York, Northern Australia.

In the possession of the Zoological Society.

PTILOTTIS FILIGERA. (Aves, Pl. XXXIV.)

Upper surface, wings and tail rich olive-brown, with numerous small marks of greyish white on the apical portion of the nuchal feathers ; the wing-coverts broadly, and the remainder of the feathers narrowly edged with brownish buff ; from the gape beneath the eye a streak of white ; ear-coverts blackish grey ; from the centre of the lower angle of the ear-coverts a very narrow streak of silky yellow, which, proceeding backwards, joins the line of white from beneath the eye ; throat brownish grey ; under surface sandy buff, the feathers of the breast and the middle of the abdomen with lighter centres ; bill olive-black ; naked space beneath the eye yellow ; legs and feet slate-colour.

Total length, $7\frac{3}{4}$ inches ; bill, 1 ; wing, 4 ; tail, 3 ; tarsi, $\frac{3}{4}$.

Hab. Cape York, Northern Australia.

Remark.—The young is destitute of the white marks on the nape, and has the under surface more rufous, and without the lighter centres.

This species is somewhat allied to *Ptilotis unicolor*.

In the collection of the Zoological Society.

ARSES KAUPI.

Small spot on the chin, crown of the head, lores, line beneath the eye, ear-coverts, broad crescentic band across the back, and a broad band across the breast, deep shining bluish black ; wings and tail brownish black ; throat and a broad band across the back of the neck white ; lower part of the back and abdomen white, the base of the feathers black, which, occasionally showing through, give those parts a mottled appearance ; bill bluish horn-colour, becoming lighter at the tip ; feet black.

Total length, $6\frac{1}{2}$ inches ; bill, $\frac{1}{2}$; wing, $3\frac{1}{4}$; tail, $3\frac{1}{4}$; tarsi, $\frac{3}{4}$.

Hab. North coast of Australia.

Remark.—I embrace this opportunity of paying a just compliment to my friend Dr. Kaup, whose ornithological labours are so well known to all naturalists : the compliment is the more appropriate, as he is at this time engaged in preparing a monograph of the *Muscicapidae*, to which family this bird belongs.

Genus PYCNOPTILUS.

Gen. Char.—Bill shorter than the head, slightly notched at the tip ; culmen inclining downwards ; nostrils basal, rather large, and partially covered with an operculum ; base of the bill beset with a few fine bristles ; wings short, very concave, round in form, the first quill very short, the second, third, fourth and fifth gradually increasing in length, the sixth, seventh, eighth and ninth equal and the longest ; tail moderately long, rounded, the feathers soft and yielding ; tarsi



J Wolf, lith

M & N Hanhart imp

ORIOULUS BRODERIPH. Bonap

considerably longer than the toes ; hind-toe strong, lateral toes equal ; plumage dense and silky.

PYCNOPTILUS FLOCCOSUS.

General plumage brown, inclining to rufous on the lower part of the back, upper tail-coverts and tail ; forehead, lores, throat and breast dark reddish buff, with a very narrow crescent of dark brown at the tip of each feather ; centre of the abdomen greyish brown, crossed by crescentic bands of black ; flanks and vent brown, passing into deep rufous on the under tail-coverts ; bill brown ; base of the under mandible fleshy brown ; legs and feet fleshy brown.

Total length, 7 inches ; bill, $\frac{5}{8}$; wing, $2\frac{3}{4}$; tail, 3 ; tarsi, $1\frac{1}{4}$.

Hab. Interior of New South Wales.

8. DESCRIPTIONS OF TWO NEW SPECIES OF ORIOLE.

BY CHARLES LUCIEN, PRINCE BONAPARTE.

ORIOULUS BRODERIPII, Bp. (Aves, Pl. XVIII.) *O. viridè flavo-aurantius ; coronâ occipitali, alis, rectricibusque ad basim mediis duabus ferè omnino nigris ; speculo alari flavo.*

Hab. in insulâ Sumbava.

Magistratui illustri, litium Conciliatori intricatissimarum, qui intimas Doctrinæ Naturalis recessus Populo humanissimè patefacit !

After the separation of *aureus* and *regens* this new species is certainly the most splendid of the true *Orioli*, of which I know fifteen species. It must therefore stand first in the series coming from *Sericulus*. Its nearest approach is *O. cochinchinensis* (*hippocrepis*, Wagl.), similar in form and stature. But in addition to its even stouter bill, the general orange hue and the yellow spot on the wing will at once distinguish our *Broderipii*.

Having dedicated an Oriole to Broderip, I dedicate a second new species to our Italian Broderip, Professor Fr. Baraffi of Turin, the celebrated and learned traveller.

ORIOULUS BARAFFII, Bp. *O. flavo-olivaceus ; cervice, corporeque subtus flavissimis ; capite, nuchâ, juguloque nigerrimis ; alis nigris, speculo angustè albo ; rectricibus nigris, apice externarum magis magisque flavis.*

Hab. Ashantee.

This bird, received at the Leyden Museum from the West Coast of Africa, is similar in stature and colour to *Oriolus moloxita*, Rüpp. of the Eastern Coast, but well distinguished by the conical marking on the tail, which is similar to that of the common Oriole, the *Broderipii*, and *chinensis*, entirely wanting on the tail of *O. moloxita*.

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ERRATUM.

Page 106, Art. 4, for *Metopocerus cornutus* read *Iguana rhinolopha* throughout.



